1998

Principals' Perceptions Regarding The Integration Of The Internet Into Public Schools In A Rural County Of New Jersey

Tracey Servens
Seton Hall University

PRINCIPALS' PERCEPTIONS REGARDING THE INTEGRATION OF THE INTERNET INTO PUBLIC SCHOOLS IN A RURAL COUNTY OF NEW JERSEY

By
Tracey Severns

Dissertation Committee

Anthony J. Colella, Ph. D.
George Lindemer, Ph. D.
Elizabeth Nastus, Ed. D.
Dwight Pfennig, Ed. D.

Submitted in partial fulfillment of the
requirements for the Degree of Doctor of Education
Seton Hall University

1998

ABSTRACT

PRINCIPALS' PERCEPTIONS REGARDING THE INTEGRATION OF THE INTERNET INTO PUBLIC SCHOOLS IN A RURAL COUNTY OF NEW JERSEY

The Internet, an interconnected, interactive, global network offers schools unprecedented power, promise and problems. As such, principals must be prepared to manage the pedagogical and administrative challenges associated with Internet access. This multiple case study was designed to examine principals' perceptions regarding the Internet for the purpose of uncovering factors that may shape the role they play in the integration of telecommunications in schools.

Participants in this study included a random sample of elementary and secondary principals in a rural county of New Jersey. Participants included two K-8 principals, three middle school principals and three high school principals.

Qualitative methods of data collection involved in-depth individual interview, direct observation and a comprehensive document review. A standardized open-ended instrument was used to elicit information regarding principals' beliefs, attitudes, feelings, behaviors, knowledge and experience with the Internet in educational settings. Content analysis was used to analyze the data and triangulation of sources was used to enhance validity.

Findings indicated that the perceptions of principals regarding the Internet were largely determined by the nature and degree of direct experience the principal had with the medium. As the technology moved from "intrusive to invisible," principals attitudes and behaviors progressed through a predictable series of stages that were found to influence the administrator's approach to the array of issues associated with Internet access in schools. Factors associated with a principal's stage of technology learning included: the nature and degree of hands-on

computer experience, particularly the need to teach others; recency of training or enrollment in post-graduate degree programs; and presence of a technology coordinator. Degree of technological proficiency was found to be related to the depth, breadth and detail in principals' responses. Principals in the middle proficiency level were more likely than those in the high and low proficiency levels to clearly define their school's technological mission, identify specific educational applications and the resources necessary to support them, recognize potential problems and solutions, and incorporate a greater number of leadership behaviors in their role as principal.

PRINCIPALS' PERCEPTIONS REGARDING THE INTEGRATION OF THE INTERNET INTO PUBLIC SCHOOLS IN A RURAL COUNTY OF NEW JERSEY

By
Tracey Severns

Dissertation Committee

Anthony J. Colella, Ph. D.
George Lindemer, Ph. D.
Elizabeth Nastus, Ed. D.
Dwight Pfennig, Ed. D.

Submitted in partial fulfillment of the
requirements for the Degree of Doctor of Education
Seton Hall University

1998

Acknowledgements

When I first told my husband that I was interested in enrolling in the Ed. D. Program at Seton Hall University, he was understandably wary. He had already experienced the tribulations of living with a perfectionist who was completing a master's degree while working full time. He had witnessed countless "all nighters" marked by the clacking of a typewriter. He had spent many evenings and weekends alone while trips to the library, meetings with study groups, class sessions or seminars, and hours spent on an array of assessments filled my personal agenda.

Yet despite the many sacrifices he had already endured, he encouraged me to pursue an advanced degree program. Eight years, and hundreds of hours of academia later, I am faced with one of the greatest challenges of my educational career: how to adequately thank all of the people who were there to support me, challenge me and encourage me to persevere when I thought that I could go on no longer.

Anthony Colella, my mentor, taught me as much about myself as a person as he did about educational administration and successful dissertations. I am particularly grateful for his faith in my original proposal and the spiritual support that helped make it a reality. I am living proof of the truth behind Tony's favorite adage: if you see it, and you believe it, then you will achieve it.

I am also indebted to the other members of my committee. I would like to thank George Lindemer for his patience and support. Since the inception of this project, Dr. Lindemer provided the information and inspiration necessary for the development of a pilot study that could be transformed into a dissertation of which I can be truly proud. Dwight Pfennig helped

me believe that I could actually finish my dissertation. I am particularly grateful for his scholarly research on administrative computing and instructional leadership which served as an excellent model of proper dissertation form and content. Finally, a heartfelt thanks to Elizabeth Nastus for her willingness to ask the big questions while keeping an eye on the smallest details. Without her professional, personal and scholastic support, this project would likely have remained an elusive aspiration.

I would like to express my sincerest thanks to my friends and colleagues who have so graciously listened to my problems, dried my tears and boosted my ego. To Becky, Cheri, Lisa and Theresa, I thank you for always being there when I needed you. Sharon and Angelina were a tremendous source of inspiration. I drew power and optimism from our collective experiences and unyielding ambitions. This study would not have been possible if it were not for Michelle. Her patience, consideration and attention to detail transformed hours of tape into discernable transcriptions. Chapter four is the result of the quality of her workmanship.

I am grateful to the unwavering support provided by my family over the past several years. To my husband, Scott Severns, this work is a testament to the strength of our relationship. Thank you for your love, faith and support. To my grandmother, Grace Nelson, I appreciate the hours of child care provided so that I could have quiet, uninterrupted time to write. To my mother, Diane Newlander, I am thankful for the countless discussions on the telephone and at family gatherings which helped me clarify my thinking and reaffirm my belief in myself and my topic. To my father and stepmother, Robert and Diane Grimyser, your pride and confidence sustained me through the difficult times and helped me believe that no hurdle was too high to surmount.

This study is dedicated to my two children, Robert and Jessica. You have sacrificed much throughout the years because of "mommy's school." Although I am saddened by time lost, I am hopeful that you will one day understand what I have worked to accomplish and pursue your own dreams with the same dedication, intensity and passion. For the first time in your entire lives, I can honestly say, "Mommy is almost done."

TABLE OF CONTENTS

Chapter I

Introduction

Introduction

> Our country was built on a simple value that we have an obligation to pass better lives and better opportunities on to the next generation. Education is the way we make that promise real. Today, at the dawn of a new century, in the middle of an information and communications revolution, education depends upon computers. If we make an opportunity to every student, a fact in the world of modems and megabytes, we can go a long way toward making the American Dream a reality for every student. Not virtual reality - reality for every student. -- President Clinton (Getting America's Students Ready for the 21st Century, 1996, p. 1)

Since its inception in the mid1600s, the course and quality of American education has been significantly affected by the sociological context in which it exists. Even a cursory glance at the nature of education within each century confirms the obvious link between the content and methods of instruction, and the predominant needs of the times. In the 17th century, the inculcation of Puritanical values of hard work and literacy were believed to be necessary to establish a proper society in the New World. In the 18th century, cultivating nationalism and creating a uniquely American identity were necessary after winning political independence from Great Britain. In the 19th century, the enculturation of immigrants and the need to train large numbers of people for life in an increasingly urban and industrial society were required in order to ensure a productive workforce (Gutek, 1988). In the 20th century, the introduction and proliferation of the telephone, television and computers resulted in the emergence of a new form of literacy, information literacy, required for meaningful participation in an Information Age.

The United States is now in the midst of a technological revolution which will have a

profound effect on the way Americans live, learn, work, and play in the 21st century. The driving force behind this change is the merging of the telephone, television and computer into a multimedia communications system commonly referred to as the "information superhighway" (The Children's Partnership, 1994). The power of the system is derived from the synergy of its constituent parts: it allows two-way, instantaneous, world-wide interaction and exchange of information. The result has been a fundamental shift in the nature of society.

> Computer technology is carrying us into an era when the production and distribution of knowledge and information will be vastly more important than the production and distribution of things. We have not begun to grapple with the implications of this for society, and especially for the way we earn a living, educate our children, and manage our economies. (Zuckerman, 1994, p. 90)

Virtually every major industry in the world has begun to rely heavily on computers and telecommunications to do its work. As a result, strong economies that were once predicated on access to natural resources, cheap labor, and efficient manufacturing no longer retain their competitive edge (Marsh, 1993).

> In a knowledge-based economy the most important domestic political issue is no longer the distribution (or redistribution) of wealth, but of the information and media that produce wealth. No nation can operate a 21st-century economy without a 21st-century electronic infrastructure, embracing computers, data communications, and the other new media. This requires a population as familiar with this informational infrastructure as it is with cars, roads, highways, trains, and the transportation infrastructure of the smokestack period. (Tofler, 1991, p. 368-369)

In what Marsh (1993), refers to as the new "transnational economy," land, labor and money are less important than the intelligence and skills of the workers.

> The most important jobs in a modern economy are based on technical education and information technology, jobs for which the vast majority of the current work force and new school graduates are unprepared. In coming to terms with the new realities of the global economy, the United States is confronted with an awesome task of retraining the work force and changing schools to assure that our citizens have skills and knowledge

> equivalent to international competitors. There is a new world standard and we are falling behind. (Marsh, 1993, p. 2)

The relationship between the economy and education is further exemplified by Department of Labor statistics. During the last 40 years, Americans have witnessed a steady increase in the minimal competencies necessary to earn a living. At the end of World War II, the average American needed only a fourth grade education to be in the 50th percentile in salary. In the 1990s, a twelfth grade education is necessary to reach the same level. Today, a college graduate earns more than twice as much as someone with less than 12 years of education. There now exists the greatest gap between high and low income earners in the history of the nation (Hundt, 1996).

Concomitant with changes in earning potential are shifts in employment opportunities and occupations. Looking ahead to the year 2000, Drucker (1994), predicts that "knowledge workers" will make up one third of the workforce in the United States. By the year 2005, the fastest growing occupational groups in the nation will be executive, administrative, and managerial; professional specialty; and technicians and related support occupations (Hundt, 1996). Judging from this information, Latcher (1996), predicts "Those who can harness the tools that access and exploit available information speedily will be at an advantage in securing the jobs of the future" (p. 36).

To fulfill these new job functions, workers will require a new set of skills. The ability to communicate, work as part of a cooperative effort or collaborative team, and demonstrate technical expertise will assume unprecedented importance (Lord, 1995). More specifically, Marsh (1993) suggests that workers must learn to manage telecommunications and computing,

work with electronics, access on-line catalogs, use electronic circulation systems, and manage data on optical disks and CD ROMS. In short, the ability to assume a profitable position in the American workplace will depend on electronic telecommunication proficiencies (Getting America's Students Ready for the 21st Century, 1996).

While these authors look to the future, there is evidence to suggest that the present workforce has experienced changes as a result of the demand for computer proficiency by prospective employers. In 1984, 25% of workers used computers on the job. In 1993, 47% did. In the early 1990s, workers with computer skills earned 10% to 15% more than workers without such skills. Today, more than half of high-wage jobs require technological literacy and the use of networked computers (Hundt, 1996). By the year 2000, 60% of new jobs will require skills possessed by only 22% of new workers (Bennett, 1996b).

Better paying jobs will increasingly require both basic literacy, the ability to read, write, and calculate at a relatively advanced level, and information technology skills. Lower paying jobs that require little education will gradually disappear (The Children's Partnership, 1994). "According to US Department of Labor statistics, there will be few opportunities for individuals who have no technological training and those without a high school diploma may find no opportunities at all (Bennett, 1996b, p. 1).

The economic implications of a technologically illiterate workforce has caused information literacy to emerge as a national political priority. In his State of the Union address in January 1996, President Clinton issued the following challenge, "Every classroom in America must be connected to the information superhighway with computers and good software and well-trained teachers." In order to achieve this objective, the president outlined four goals for

technology in schools:

> All teachers in the nation will have the training and support they need to help students learn using computers and the information superhighway. All teachers and students will have modern multimedia computers in their classrooms. Every classroom will be connected to the information superhighway. Effective software and on-line learning resources will be an integral part of every school's curriculum (Getting America's Students Ready for the 21st Century, 1996, p. 2).

The president's message speaks to the national agenda: the success of the nation will depend on students' ability to acquire the skills and knowledge necessary for informed citizenship and employment in a highly technological society (Getting America's Students Ready for the 21st Century, 1996).

A similar message has resounded through the halls of Congress. The Improving America's Schools Act of 1994 recognized the potential of technology to greatly improve the educational system in general and the growth of students in particular.

> The Congress finds that technology can produce far greater opportunities for all students to learn to high standards, promote efficiency and effectiveness in education, and help propel our Nation's school systems into very immediate and dramatic reform, without which our Nation will not meet the National Education Goals by the target year 2000 - US Congress (Congress, 1994).

A similar call for educational reform has been sounded in national position papers published by United States government agencies or advisory councils. In the Secretary's Commission on Achieving Necessary Skills report, "What Work Requires of Schools" (Secretary's Commission on Achieving Necessary Skills, 1991) and "Goals 2000," authored by the Office of Educational Research and Improvement (OERI, 1994a), information literacy is touted as the "new direction" in education. Both reports recommend a greater focus on teaching all students to become independent lifelong learners and critical thinkers, to use a variety of

technologies proficiently, and to work effectively with others.

Similar initiatives have been undertaken at the state level. On May 1, 1996, the New Jersey State Department of Education officially adopted a set of "core curriculum content standards" that served to operationalize what is meant by a "thorough and efficient education" and identified expected student outcomes for high school graduates. The purpose of codifying the standards was to move toward guaranteeing the same high quality education for all children in New Jersey (NJ State Department of Education, 1996). Notably present among the goals in each of the seven academic areas are specific objectives pertaining to the use of a variety of technologies to gather, to express, and to display, information, data, and concepts. In addition, an accompanying set of "workplace readiness standards" that transcend traditional academic lines are included. Present among these objectives are career preparation; information technology and other tools; critical thinking, decision making and problem solving; self-management; and safety principles. The prevalence of technology-based proficiencies identified as core curriculum standards gives credence to the contention that computer literacy is considered a basic skill for life in a technological society.

Additional evidence of the state's commitment to educational technology is the integral part it plays in the New Jersey State Department of Education's Strategic Plan for Systemic Improvement of Education in New Jersey. The Strategic Plan includes 11 major goals, all focused on students' achievement of the Core Curriculum Content Standards. Included among these objectives is Goal 10: to provide statewide coordination for the effective and efficient use of technology to enhance instruction and the management of information (NJ State Department of Education, 1995).

On the county level, school districts in New Jersey were required to submit a Local Technology Plan to their respective county office of education by December 1, 1997 in order to qualify for: the Distance Learning Network Aid Fund of 40 dollars per student, grant programs pertaining to the Technology Literacy Challenge Fund, and discounted rates from telecommunications carriers for basic access to the Internet as part of the Telecommunications Act of 1996. Required components of the plan included: an executive summary that contained a vision or mission statement; a detailed description of the planning process and the means by which the district would move from their current level to the realization of their goals; a status report that described the school's use of technology to support distance learning activities; goals and objectives regarding how technology would be used to enhance teaching and learning; a technology inventory that surveyed present levels of hardware, software and connectivity; a description of current and anticipated building facilities; implementation strategies that would be used to facilitate student achievement, infuse technology in curriculum, promote equitable access to resources, and address the four national technology goals; staff development opportunities for teachers, administrators and media personnel; a spending plan that budgets for the expenditures associated with the technology plan; and an evaluation component that would provide ongoing assessment of the technology plan.

On the local level, there is little disagreement among the public that technological literacy has joined reading, writing, and mathematics as the "new basic" (Ross and Bailey, 1994; Getting America's Students Ready for the 21st Century, 1996). In a survey conducted by the Public Agenda Foundation and cited in the US Education Department's report on Technological Literacy, 80% of Americans feel teaching computer skills is "absolutely essential"; more than

three-quarters of Americans have encouraged a child to use a computer; and 86% believe that a computer is the most beneficial and effective product they could buy to expand their child's opportunities (Getting America's Students Ready for the 21st Century, 1996).

In a review of the literature, Hawkridge (as cited in Wang, Johnson & Pisapia, 1994), lists four reasons for infusing technology into schools: the "social rationale" -- to ensure that children are unafraid of computers and that they understand the role computers play in society; the "vocational rational" -- to develop computer skills and competencies for employment opportunities; the "pedagogic rationale" -- to capitalize on the educational advantages of computer-based learning over traditional methods; and the "catalytic rationale" -- to recognize the potential of the computer to serve as an impetus for change and restructuring in schools.

Yet despite powerful economic, political and social forces that are compelling educational institutions to take their place on the information superhighway, schools continue to operate in much the same way as they did in the 1950's (Bennett, 1996a). In fact, Ross and Bailey (1994), suggest that schools have remained virtually unchanged for more than 100 years. Why?

Hawkins (1996), suggests that the reason that most schools have not yet taken advantage of the opportunities afforded by technology is that educators have primarily focused on the question: "Should schools have computers?"-- rather than on the more productive one: "How are technologies best used in education to realize high achievement standards now being developed by states and to prepare students for the world they will enter when they leave school?"(p. 2). Hawkins (1996), suggests that, "Education is the only 'knowledge industry' still asking the question of whether modern technologies should be part of the enterprise of learning and work"

(p. 2).

As the primary agency charged with the edification and preparation of children for active and productive citizenship, schools are called upon to meet the changing needs of the society it serves. As society changes, therefore, so too does the definition of what it means to be educated. Drucker notes, "An educated person in a knowledge-based society will be somebody who has learned how to learn and who continues learning, especially by formal education, throughout his or her lifetime" (Drucker, 1994, p. 71). In an Information Age, the key to lifelong learning is "Mastering the powerful new technologies which will allow us to adapt to a rapidly changing, increasingly interdependent, culturally diverse, and technologically complex world" (Maskin, 1996, p. 59).

If success in a knowledge-based society depends upon one's ability to process information, then schools must teach a new form of literacy. "Literacy can no longer be regarded simply as verbal and mathematical skills but must include technological competence"(Marsh, 1993, p. 2). Ross and Bailey (1994) define this new form of information literacy as the ability to access, analyze, apply, create and communicate information electronically.

In their analysis of historical literacy eras, Ross and Bailey (1994) trace the progression of human literacy through four eras: pictographic, oral, bibliographic and electrographic. In its earlier forms, little education was required to understand the messages conveyed in pictures or through the spoken word; they were self-explanatory. With Guttenberg's invention of movable type in 1454, however, written communication took the form of a letter-based system, and for the first time in history, formal education was required in order to learn how to decode and

encode written symbols into meaningful messages (Ross and Bailey, 1994).

During the course of the last 400 years, the education system has developed and refined teaching methods and materials designed to promote this letter-based form of literacy. The problem is, traditional methods of reading and writing are inefficient means of managing the volume of information available through the emerging electronic technologies (i.e. interactive video disc, CD-ROM, modem, and the personal computer). Instead, Ross and Bailey (1994) suggest that students require "electrographic literacy" to assimilate, digest, absorb and express huge quantities of information.

> To be literate in the twenty-first century, people need the capacity to understand the images being created on computers, in studios, and across networks and to communicate back in the same language. Failure to grasp this new style of communication leaves people at the mercy of those who can. To the illiterate, information is not a tool, but a terror; not a servant, but a master; not something to communicate with, but something to be overwhelmed by. (Ross and Bailey, 1994, p. 33)

What will this new language look like? Ross and Baily (1994) provide a detailed and comprehensive description of the qualities and characteristics of this new form of literacy: It is electronic, combining all of the digital technologies, including microcomputers, laptops, mainframe, networking, on-line databases, facsimile transmission, distance learning, satellite, cable TV, microwave, modem, video disc, CD-ROM, and electronic card catalogue. It is imagery, taking vast quantities of information and expressing it in text, sound, graphics, and video. It is multi-sensory, incorporating sight, sound, smell and touch. It is emotional, using affective techniques to convey data and communications with the added dimension of two-way communication. It communicates over distance, allowing everyone to communicate with everyone irrespective of time and place. It is multi-cultural, speaking an international language

that has the potential to transcend ageism, sexism and racism. It is collaborative, involving countless people in its creation and communication. It is artistic, expressing information in various forms that do not depend on users' talents but on their ability to manipulate the tools in creative ways. It is interactive, allowing a dynamic exchange between the user and the information. (Ross and Bailey, 1994).

Such a rich description affords a simple comparison. Despite millions of dollars and numerous public and private initiatives, "Fifty million American children go to school in a nineteenth century world of chalk-and-blackboard technology" (Hundt, 1996, p. 6). The vast majority of schools have done little to promote this kind of literacy through the successful integration of educational technology into American public schools (Bennett, 1996a).

> There are thousands of buildings in this country with millions of people in them who have no telephones, no cable television, and no reasonable prospect of broadband services. They're called schools. -- Reed Hundt, Federal Communications Commission Chair (cited by The Children's Partnership, 1994, p. 10)

The chasm between these projected trends and the current reality creates a compelling case for research and examination. The fact remains that, "Today, the nation's schools represent the most effective way to reach all of America's children and teach them the skills and knowledge they will need for the challenges of the 21st century" (The Children's Partnership, 1994, p. 10). Who has the power to narrow the gap between what "is" and what "should be," and how will these changes be made? Who will be responsible for leading schools into the new technological era and what factors will shape their leadership?

"The importance of the school principal as an instructional leader or change agent has been well documented in the literature" (Bennett, 1996a, p. 57) (Dwyer, 1984; Gainey, 1994;

Levinson, Doyle, & Benjamin, 1993; Southern Technology Council, 1997). As schools are increasingly influenced by the proliferation of new technologies in society, school administrators' attitudes and actions assume an unprecedented importance in the future of education. "If technology is to be integrated into the school curriculum, the meaning of educational leadership and the role of the school principal within a technological paradigm must be redefined" (Bennett, 1996a, p. 57).

Although numerous authors have attested to the pivotal role that administrators play in the successful integration of technology in schools, few have been able to quantify the extent of its importance. In a study of over 200 schools in 18 states that were identified as exemplary in their implementation of technology, the Southern Technology Council (1997) found that of the 11 change strategies derived from the educational literature on technology, "got administrative support early in the process" was reported as a strategy used by 99.4% of respondents. In addition, on the "Mean Indicator of Helpfulness" scale that ranged from 1 (did not help) to 4 (helped a lot), 81.5% of respondents assigned this dimension of administrative support a rating of 4, the highest rating available. The resultant mean of 3.8 on the helpfulness rating scale was the highest of all the change strategies.

Inasmuch as garnering administrative support was found to be instrumental in the successful implementation of technology in exemplary schools, the lack of administrative support has been found to exert a deleterious effect on schools struggling to adopt new technologies.

> The potential for technologies to enhance classroom instruction and school administration is widespread, but the majority of schools have yet to implement technologies beyond a basic level. Reasons for this reluctance are varied, but often

include a lack of support from school administrators. (Ritchie, 1996, p. 42)

If administrative support is a necessary prerequisite for the successful integration of technology in schools, the reasons underlying this support, or the lack thereof, assume unprecedented importance. Few studies have attempted to identify the factors that shape the attitudes, perceptions and behaviors of principals with respect to their interaction with computers. This multiple case study was designed to examine and describe the perceptions of principals with regard to the Internet for the purpose of uncovering factors that may contribute to the role that principals play in the integration of telecommunications in the schools they lead.

Statement of Problem

If principals are to assume a leadership role in education reform efforts that will lead to more effective utilization of educational technology in schools, they must be familiar with the technology and conversant in its applications. Without a clear understanding of the Internet, it is unlikely that administrators will be willing and able to make sound decisions regarding appropriate educational applications of Internet access and the allocation of resources (in terms of time, money and personnel) that will make this technology available.

The purpose of this study was to examine principals' perceptions regarding the utilization of the Internet in elementary and secondary schools. This investigation sought to examine the personal, educational and institutional factors that affect a principal's ability to address the administrative and pedagogical issues associated with providing children with Internet access. Once identified, this study attempted to examine the manner in which these factors contribute to, and manifest in, the leadership role that principals play in the integration of the Internet in public schools.

"The common vision of the Internet as a promising educational tool for the new millennium features connectedness and accessibility to information as defining traits" (Windschitl, 1998, p. 28). Research suggests that although rural schools stand to benefit most from Internet technology, they are the most under served of all the nation's schools (Salvador, 1997; Barker, 1995). Telecommunications can "help rural schools overcome disadvantages of remoteness, geographical isolation, lack of specialized staff, and limited program offerings" (Barker & Taylor, 1993, p. 1). In addition to minimizing isolation, computer networks in small, rural schools can develop stronger links to the community, access reference information from remote sources, and create professional and academic exchanges for teachers, administrators and students (OERI, 1994b).

Significant disparities in access to the Internet have been documented between urban and rural school districts (Brown, Barram & Irving, 1995; Mayer, 1997; Southern Technology Council, 1997; Zenanko, 1996). In a 1996 study that involved interview reports from 31 states, urban districts were three times as likely to have dial-up or dedicated access as rural school districts. (Mayer, 1997). A separate study conducted in 1996 by the Texas Education Network (TENET) and cited in Mayer (1997), found that technology coordinators from one "typical" urban and one "typical" rural district in each of the 50 states reported that rural districts were far more likely to have lower capacity network connections than their urban counterparts.

Equally disconcerting is the disparity in anticipated annual increases in districts with dial-up and dedicated network access. Mayer (1997) found that despite state and federal policies that were intended to close the gap between the information "haves" and "have nots," urban districts were far more likely to report higher expected increases in dedicated access from 1995

to 1996, and from 1996 to 1997 than comparable rural districts.

Although economic, geographical, educational and cultural reasons appear to affect the level of Internet access provided to urban and rural schools, a report of Best Practices and Policies from Exemplary K-12 Schools suggests that effective implementation of educational technologies has more to do with leadership and organizational change than any other factor (Southern Technology Council, 1997). As such, a closer look at the role of the administrator in small, rural schools appears warranted.

Much of the research conducted on educational technology is of an empirical nature, addressing such quantitative dimensions as the number of students with computer access, amount of money spent on various technology-related expenditures, the various levels of connectivity, changes in achievement scores or attitudinal ratings, and so on. Windschitl (1998) suggests that although these numbers may be meaningful, they are an inadequate means to understand the complex changes that occur as a result of the introduction of technology in schools. Windschitl (1998) creates a compelling case for the use of qualitative methodologies to "add valuable context to what is learned from the more theoretically constrained approaches of investigation based on instrumentation and identification of significant differences" (p. 31). Windschitl suggests that the most important questions about technology are not approachable via quantitative means "because technology, when used to its best advantage, helps reshape roles for teachers and learners and encourages new and different types of interactions in the classroom" (1998, p. 31). As such, qualitative approaches may be considered most appropriate in that they often emphasize discovery of, rather than verification of, theoretical positions (Fetterman, 1989; Wolcott, 1988). "Today, when scant information exists on a topic, when variables are unknown,

when a relevant theory base is inadequate, incomplete, or missing, a qualitative study can help define what is important - that is, what needs to be studied" (Leedy, 1997, p. 156).

Notably absent in the research is an objective, systematic attempt to study the effect of the novel characteristics, constraints and challenges of the Internet on public school administrators. Ross (1996) notes, "New technologies have only been examined from the anecdotal investigations of enthusiasts who seek implementation in all areas of education" (p. 2). As increased demands are placed on principals to utilize educational technologies to improve academic achievement and increase administrative efficiency, a qualitative examination of the perceptions and perspectives of building level principals, devoid of any particular subjective agenda, is necessary in order to elucidate administrative issues pertaining to the integration of Internet technologies in schools .

Research Questions

This research study was designed to answer the following questions which examine the role of elementary and secondary principals in establishing an effective means by which to ensure the appropriate educational utilization of Internet technology in public schools. The research questions are as follows:

Question 1. How do principals believe schools can best prepare students for the demands of both the current and future information age?

Question 2. According to principals, what is the role of information technologies in schools?

Question 3. What do principals consider the role of schools in the age of information technology?

Question 4. What do principals identify as the potential risks and benefits of providing children with access to the Internet?

Question 5. What do principals consider necessary to effectively plan, implement and maintain a technologically integrated educational program that includes access to the Internet?

Question 6. What do principals describe as barriers that impede successful integration of on-line resources in schools?

Question 7. How do principals characterize the role of the principal in the introduction, implementation and integration of the Internet in schools?

Question 8. How do principals intend to establish and to update their knowledge and skills of the most current uses of technology in education?

Question 9. What personal, educational or institutional factors appear to shape principals' perceptions regarding the utilization of the Internet in schools?

Limitations of the Study

The participants in this study included a random sample of elementary and secondary principals in Warren County, New Jersey. The study was limited to public school principals employed during the months of April, May and June of 1998. Names of principals were obtained using the 1997-1998 Public School Directory published by the Warren County Office of the New Jersey Department of Education. The number of participants was limited to eight, which represents one third of the total number of principals in the county.

With respect to the topic, the study was limited to the perceptions of school principals with regard to the introduction and utilization of the Internet in public school settings. Other types of computer technologies or telecommunications such as distance learning, satellite

transmissions, cable TV, laserdisc or CD-ROM are referenced only inasmuch as they overlap with information relevant to Internet access.

With respect to procedures, the study was limited by the use of a qualitative research design that employed a standardized open-ended interview technique. Utility of the original open-ended instrument was established through its use in a pilot study conducted by the researcher in 1997. Critical analysis of the information elicited by the original questions resulted in minor modifications in the wording of two interview questions that were found to be excessively wordy, thereby clouding the intent of the question. Additional limitations included the scope of the questions and the duration and location of each interview. Research conclusions were based on the perceptions of a small and select group of principals employed in a rural county in northwestern New Jersey. Due to the unrepresentative nature of the sample and the degree of personal bias inherent in the study of human perception, the reader should be cautioned against broad generalizations of these findings to other educational settings.

Significance of the Study

The study will provide a means by which to examine principal's conceptual and skill-based readiness to serve as administrators of technologically enhanced public schools. More specifically, this study uses qualitative methodology to examine the dynamic interface between a principal's perceived proficiency level and their perspective on the implications of providing access to the Internet in elementary and secondary schools for which they are responsible. By using a qualitative research design, this study may challenge existing assumptions or suggest the importance of relationships left virtually undetected by quantitative means used in previous studies on technology integration in schools.

This study holds significance for the development of technology plans. Inadequate training of administrators may inadvertently hinder, if not preclude realization of district level goals and objectives. This study may provide guidance for the development of effective technology plans with respect to the allocation of time, physical and human resources, and training.

This study has implications for the creation of district and building budgets. Distribution of available funds must take into account the broad range of expenses associated with the acquisition, use, maintenance and replacement of computers and telecommunication services. Budgets that do not provide sufficient funds for staff development may result in the inappropriate use or gross underutilization of expensive technologies. In order for technology to fulfill its promise of improved teaching and learning, administrators, staff and students must have the time and opportunity to learn how to use it effectively.

This study holds significance for the nature of training programs designed to establish and update principals' use of existing and emerging technologies. District level inservice programs must incorporate principles of adult learning with a sensitivity toward the unique, high profile position that administrators hold. Institutions of higher learning that offer degree programs in educational administration must similarly provide administrators with a broad range of skills and understandings relevant to computers and telecommunication access in schools.

This study holds significance for the personal and professional development of principals. Within their current position, principals may experience anxiety, fear and frustration at the thought of being forced to incorporate new technologies into established routines or having their lack of computer proficiency discovered by subordinates or superintendents. As a

result, a reduced sense of self-esteem and feelings of inadequacy may cause principals to establish avoidance routines, retreat from opportunities to gain skills, or prematurely retire from the administrative arena. Furthermore, as an increasing number of administrative employment opportunities identify technological proficiency as a requisite skill for consideration, otherwise capable administrators may feel trapped in their existing position and reluctant to pursue opportunities for advancement.

This study also has political significance. Policy makers and politicians must remain cognizant of the broad range of issues that effect a school's readiness to assume its place on the "information superhighway." Perhaps the most critical, and most often ignored of these factors is the role of leader. As the number of technology-related federal, state and county mandates increase, it is imperative that the assumptions underlying these plans take into account the leadership necessary to achieve the intended outcomes.

Finally, the study holds significance for the expanding research base that describes the implications of Internet access in public schools. Through closer examination of the role of the principal in the introduction and integration of computers and telecommunications in schools, a model that considers the affective dimension of leading schools in a technological age may be developed.

Definition of Terms

Baud rate: A unit of measurement to indicate how much information in bits is being transmitted. Normally baud rates are expressed in bits per second. The larger the baud rate, the faster the information will be transmitted.

Dial-Up Connection: An Internet connection made through a host computer or through an

Internet Service Provider.

Direct Connection: A permanent Internet connection, usually established through a T-1 cable. Direct Internet connections are generally much faster than a dial-up connection.

E-mail: (Electronic Mail) A method of sending and receiving text messages via computer rather than through surface mail.

Electronic Technologies: The new ways of storing, accessing and transmitting information, combining applications of the telephone, television and computer.

FTP: (File Transfer Protocol) A method for downloading or uploading files from one computer to another via the Internet.

Hardware: The computer, wires and related machines that make up the computer system.

Information Literacy: The ability to access, manipulate, and produce information using current technologies. It is based on strong reading, writing and calculating skills and is aimed toward developing critical thinking, problem-solving and life-long learning.

Information Superhighway: A term popularized by Vice President Al Gore. It is a global, high-speed network of computers that will serve thousands of users simultaneously, transmitting E-mail, multimedia files, voice and video. This system is expected to link homes, offices, schools, libraries and medical centers, so that textual and audiovisual information can be instantly accessed and transmitted from one computer screen to another.

Interactive Media: A broad term for two-way electronic communication. It may include interaction between a user and another user, or a user and a program.

Internet: The global "network of networks" that connects corporations, small businesses, universities and individuals, giving them access to databases and "real time" communication

throughout the world.

Intranet: The use of Internet technologies within private networks, typically within established organizations.

ISDN: (Integrates Service Digital Network) These are relatively new forms of communicating on the Internet. ISDN lines allow one to simultaneously use the line for both digital and analog service; thus one can talk on the phone and be connected to the Internet at the same time.

Modem: Short for "modulate-demodulate," a device which allows computers to communicate over telephone lines or other delivery systems.

Multimedia: A combination of two or more types of information such as text, audio, video, graphics and images.

On-line or Online: Connected, linked. Working on a computer that is linked to other computer information services.

Protocol: The language that structures the way information is transmitted across the Internet.

Router: A computer or software package that handles the connection between two or more networks by using the destination addresses of the packets passing through them and determining which route by which to send them.

Search Engine: A computer program that provides location of documents and information on the Internet. Although there are numerous search engines available, the most popular are Yahoo!, Infoseek, and Alta Vista.

Software: A computer program or package of information to be used on the computer

hardware.

T-1: A leased line connection capable of carrying data at 1.544 million bits-per-second. It is the fastest speed commonly used to connect networks to the Internet.

Technological Literacy: The ability to use, understand and manipulate new tools like computers and other telecommunications devices.

Telecommunications: Telephone, satellite, cellular, wireless and other forms of electronically-transmitted information.

Telnet: A program that is able to connect to a remote computer and use the software or access the information available on that remote computer.

WWW: (World Wide Web): A huge global network of linked computer sites that point to or direct the user to text, graphic, sound, and video information. A unique element of the Web is the navigational process of hypertext, allowing the user to simply click on text that then links the user to various global sites.

Organization of the Study

This study was prepared in a five chapter format. Chapter I includes an introduction, a statement of the problem, the research questions, limitations of the study, significance of the study, definitions of terms and the organization of the study. Chapter II provides a review of relevant literature as it relates to the history and evolution of various educational technologies in schools, the nature and utilization of the Internet in schools, and the role of the principal in the management of computer technology. Chapter III presents a description of the sample county, the selected sample schools, the individual participants, the characteristics of qualitative research, the methodology and instrument utilized in the study, and the methods of data analysis

employed by the researcher. In Chapter IV the interview process is described and the qualitative research findings are presented and synthesized. Chapter V provides a summary of conclusions derived from the study, as well as implications of the research and recommendations for further investigation.

Chapter II

Review of Related Literature

Introduction

This study examined elementary and secondary level principals' perceptions regarding the integration of the Internet into public schools. In order to establish the context in which principals operate, this chapter begins with an analysis of the past, present and predicted uses of educational technologies in schools. A description of the Internet, a qualitatively different form of computing, follows. In this section, information regarding the educational risks and benefits of the Internet is provided along with statistics regarding the proliferation and utilization of the Internet in US public schools. The chapter concludes with a comprehensive analysis of the role of the principal in the integration of computers in general, and the Internet in particular, in schools.

The History of Educational Technologies in Schools

In the broadest sense, schools have been using various technologies to facilitate learning since their inception three centuries ago. Bossert (1996) contends that paper, pencils, chalk, blackboards, whiteboards, magic markers, televisions, VCRs, videotapes, books, tests, filmstrips, overhead projectors, tables, desks, chairs, maps, magazines, clips, cans, boxes, balls, pianos, paint, clay, cups, etc. constitute the full range of diverse technologies used in schools. Referring to these as "invisible technologies," Bossert suggests that our familiarity with these items have caused them to no longer be considered "technologies" at all, but rather common

elements of the environment in which we live and learn. The unwitting result is that, "Schools do not have money for technology because they are spending all their money on technology! In fact, schools are spending so much money on older, industrial age technologies that there is little left for investing in the newer information age technologies" (Bossert, 1996, p. 15).

More recently, "technology" has become synonymous with "computers" (Bossert, 1996). Yet even by this definition, it is apparent that schools are no strangers to educational technology. In fact, "Educators have used computers and other information technologies as tools to increase student learning in America's elementary and secondary schools for over thirty years" (Getting America's Students Ready for the 21st Century, 1996, p. 1). Niederhauser (1996) traces the history of computer use in schools back to mechanical "teaching machines" that were first developed in the late 1950's. In the 1960's computer-assisted instruction (CAI) was introduced in schools. CAI was developed to help students acquire basic skills, practice them, and measure learning gains.

With the advent of lower-cost personal computers in the early 1980's, the use of technology in schools broadened to encompass the use of general-purpose tools such as word processors and spreadsheets. The 1980's also saw the emergence of "distance learning" in schools, a remote, two-way communication system that allowed teachers to teach classes to students anywhere in the world via cable or satellite. During the 1990's, more powerful personal computers were able to run "multimedia" educational software that employed text, audio, video and graphics to teach students facts and concepts. CD-ROMs and other computer software became interactive, providing the opportunity for dynamic interaction between the user and the program (Getting America's Students Ready for the 21st Century, 1996).

The Internet represents the latest advance in telecommunications technologies. By establishing fiber optic connections between computers via telephone lines, an integrated network has been created, the power of which grows exponentially with each new connection. The result is an educational resource unlike any other: one with the ability to qualitatively alter the nature of learning in schools.

> The process of learning in the classroom can become significantly richer as students have access to new and different types of information, can manipulate it on the computer through graphic displays or controlled experiments in ways never before possible, and can communicate their results and conclusions in a variety of media to their teacher, students in the next classroom, or students around the world. (Getting America's Students Ready for the 21st Century, 1996, p. 1)

The Nature and Incidence of Internet Use in Schools

Originated about a quarter-century ago as a Defense Department research project to develop a military computer network capable of surviving a nuclear attack, the Internet was then further developed and funded as a project of the National Science Foundation (Wilson, 1995). Although difficult to use, the Internet, a component of the larger National Information Infrastructure, made its way into colleges and universities where computer pioneers developed and refined the software systems that now make it easy for even novices to use.

The Internet is not merely a faster version of what has come before. It is an interconnected global network of computer systems that connects thousands of computers and millions of individual subscribers all around the world. As such, it provides access to a vast array of information as well as the opportunity for "real time" communication and collaboration with people all over the world. "It is something you experience and explore and in which you participate. It is the closest thing that exists to an on-line, worldwide library of information"

(Wilson, 1995, p. 86).

The Internet is a dynamic environment. The challenge for many educators is how to integrate "revolutionary technology into an evolutionary teaching process" when most teachers and administrators do not understand the nature of the technology and how it works (Lankes, 1997). Lankes provides a model that breaks the Internet down into four basic levels: the Engineering Level -- the infrastructure that allows information to move from one computer to another; the Application Level -- the software that allows users to gather and share information; the Information Service Level -- the combination of information with hardware and software that allows users to meet their information needs; and the Use Level -- the level where users use the information they find on the Internet.

The Engineering Level is the technical part of the Internet that includes modems, routers and protocols. It is the "road" of the information superhighway, which, when working properly is "transparent" to the user. The Application Level, which includes e-mail, the World Wide Web, search engines, file transfer protocol, and Telnet, allows teachers and students to link to Internet sites that contain text, pictures and other media that they can use in their classroom. In the client/server model, applications are the cars and trucks that travel the road and transfer information from one place to another. The Information Services Level includes the information that is imported to, or exported from, the end-user. In the information superhighway metaphor, it is the cargo transported by the cars and trucks. At the Use Level, issues of security of information, acceptable use policies and intellectual property emerge. It is at this level that the philosophical or conceptual questions of why the cars and trucks are on the road and what happens to their cargo when they reach their destination, must be answered (Lankes, 1997).

Lankes (1997) contends that as the Internet grows and allows more real-time, interactive communication, educators must understand the complexities associated with providing Internet access in the nation's classrooms. Lankes suggests that his model may be used to help teachers and administrators understand the basics of how the Internet works so that they can better plan effective inservice training programs and develop technology plans that incorporate all of the critical dimensions of Internet access.

Maddux (1994) writes that before the Internet can realize its "considerable educational potential" seven critical problems must be addressed and resolved. Maddux contends that the emphasis on providing children with access to the Internet would be far more educationally appropriate if the concept of access was redefined as "practical availability to something that is educationally beneficial, not mere presence of a tool or other resource" (p. 38). Maddux suggests that acquisition of equipment ignores the more critical pedagogical issues of classroom management techniques that facilitate integration of computers into the curriculum, and articulation of the kinds of goals and objectives that the computer can help accomplish. Without a clear understanding of this important dimension of access, "it is unlikely that administrators and other decision-makers will be willing to dedicate scarce resources to making the Internet available" (Maddux, 1994, p. 38).

The issue of availability of adequate resources is one which is prevalent in the literature. Although the number of schools with access to the Internet has increased markedly over the past several years, Maddux suggests that much of the hardware and software are too antiquated to run sophisticated programs or make timely use of the Internet. In addition, schools that lack the necessary infrastructure to support educational computing, and classroom computers that do not

have a printer, often compromise the potential for technology to impact teaching and learning.

Charges for Internet access is an issue that is rarely addressed in the literature. Maddux writes that, "although the Internet seems free to many users, it most certainly is not" (1994, p. 39). Despite promises of the federal government to provide schools with free or reduced rates, the cost of an entire school's use of the Internet may be budgetarily prohibitive.

Administrators who focus on establishing connectivity in their schools often neglect to provide the two distinct kinds of support that are required to make use of the technology: technical support that addresses the faculty's need for inservice training and ongoing support with regard to the technical aspects of networking; and curriculum support which provides guidance in how to integrate Internet resources into the curriculum in various subject areas and grade levels. Maddux (1994) asserts that districts that neglect either type of support are certain to fail.

The fifth challenge that educators must face is a function of the nature of the Internet itself. Maddux (1994) contends that the unregulated, unstructured, fluid nature of the Internet presents serious concerns to teachers and administrators responsible for use of the medium by students. The tremendous volume of information available through the Internet makes locating pertinent information time-consuming and frustrating. Once found, the lack of documentation makes it difficult to identify or cite the source of the information.

A related issue is that of quality control. The traditional controls and scrutiny that are placed on printed materials are not available on the Internet: Virtually anyone can "publish" anything and post it on the Internet. Although the number of peer-reviewed electronic journals is increasing, a method of certifying the quality of information obtained through the Internet is

lacking.

Yet perhaps the most critical of all challenges facing administrators is the issue of censorship, "the only real reservation, other than financial, that administrators have to the idea of providing Internet access to classrooms" (Maddux, 1994, p. 40). Media portrayals of the Internet as a place where children can access pornographic and profane information, or be lured into dangerous situations by child abusers, have prompted many administrators, teachers and parents to question whether students should have access to the Internet in school. In an effort to avoid these problems, many school districts have attempted to censor the information available to students (Flanders, 1994). Maddux, however, asserts that censorship is not a workable solution to the problem. Problems with such an approach are threefold: it is a technical impossibility due to the interconnected nature and fluid content of the Internet; differences of opinion regarding what is acceptable or objectionable prevent universal agreement on what should and should not be permitted; and parents may be more likely to consider their children's access of inappropriate material to be a failure of the school to supervise, rather than a failure of the child to behave responsibly.

Yet despite the administrative challenges, the Internet offers the potential to greatly enhance the process and products of teaching and learning. By expanding the learning environment to include databases, computer networks, and other library sources throughout the world, the Internet makes it possible for students to "shape their own education" (Maskin, 1996). The Internet, therefore permits a kind of individualized, student-centered teaching, learning and assessment environment that is unavailable in the traditional school setting (Maskin, 1996; Edwards, 1995). Using the Internet, students can access information, explore issues, and attempt

to solve real-world problems that are timely and relevant. In this way, the Internet offers the possibility of enriching, extending and transforming the existing curriculum (Dyrli & Kinnaman, 1996).

In an early review of the literature on information skills programs operating in industrial nations throughout the world, Kirk reports that "the most impressive feature of microcomputers is their potential for changing the way people think" (1987, p. 10). Kirk suggests that micro computing encourages flexible, and adaptive, independent thinking and stimulates the development of skills in analysis, synthesis, decision-making, problem-solving and evaluation. Further, this benefit was found to exist regardless of students' ability levels.

Specific studies of on-line searching found that students were introduced to a "new dimension" of resources that served to promote their ability to research, access, read and interpret information (Kirk, 1987). After conducting a review of the research on the use of the World Wide Web in schools, Owston (1997) reports that the advantages of the Web fall into three distinct categories: the Web offers students a highly visual, interactive mode of learning that capitalizes on how students prefer to learn; the Web contributes to a more student-centered learning environment in which the teaching becomes less didactic and more project-based; and the Web fosters the development of new skills and learning.

> Thus teachers can encourage students to explore the Web with the goals of having them weigh evidence, judge the authenticity of data, compare different viewpoints on issues, analyze and synthesize diverse sources of information, and construct their own understanding of the topic or issue at hand. By doing so, teachers will be well on their way to having students develop critical thinking and problem-solving skills using what the Web can offer that traditional materials cannot: information that is instantly available, often very up-to-date, world-wide in scope, and presented in a more motivating format for students to explore. (Owston, 1997, p. 29)

In addition to the educational benefits made available through the Internet, there is also the potential for problems. On a very pragmatic level, technical problems can undermine an otherwise well-designed on-line lesson and lead to frustrations for both students and teachers. Owston (1997) identifies several of the problems that may occur at different stages of Internet use. When trying to establish a connection: malfunctioning computer hardware, software that makes it difficult to access educational institutions or the Internet service provider, and frequent busy signals when using a dial up modem, may prevent students from connecting to on-line resources. Once a student gains access, heavy on-line traffic may cause Web sites to respond very slowly or not at all and breaks in telephone connections force the student to begin the process all over again. In addition, the costs associated with on-line access, whether through an Internet provider or a dial-up connection may result in budgetary problems that preclude use of the medium.

Beyond the technical problems, access to the Internet introduces significant pedagogical and philosophical issues into the educational arena. The Internet is not governed by any entity. It is essentially an unregulated medium that lacks central authority and management. As such, there are virtually no limits or checks on the kind of information that is maintained by, and accessible to, Internet users (National Center for Missing and Exploited Children, 1994). Consequently, the Internet is also a place where students may access offensive materials and be subjected to harassment by other members of the electronic community. Although various attempts have been made to "filter out" objectionable sites, the interconnected structure of the Internet makes it virtually impossible to isolate or eliminate access to remote locations of the Internet. Furthermore, the fluidity of the Internet, its inherent ability to grow and change by the

minute, makes any attempt at external regulation an exercise in futility (Schofield, 1994).

The result of this reality is that it solves one problem and creates another: the inability to control the flow and exchange of information renders censorship a non-issue; but the fundamental shift in the onus of responsibility from the school to the student requires a reconceptualization of hierarchical control issues typically existent in schools (Hodas, 1994). For this reason, Hodas (1994) has likened the introduction of the Internet in schools to a modern day Trojan Horse. Hodas believes that if schools today realized the implications of the power of the Internet to challenge and fundamentally alter existing power structures, they may never allow it in the door.

> Schools are predicated on fairly simple and rigid hierarchies of authority, both intellectual and otherwise. Their organization assumes an essentially one-way flow of information from a teacher or textbook that's been authorized by the state as an information source, to the student who's required periodically to reflect that information back. Contrast this with the nature of flow and authority vesting on the net. There, hierarchy is mostly flattened. Credentials and other types of formal certification are, by and large, less important than earned credibility. And the roles of the participants are fluid. They are likely to be information seekers one moment, and information sources the next. (Hodas, 1994, p. 2)

As one of the oldest and most highly developed forms of information technology, schools maintain a vested interest in perpetuating the values and practices, with regard to information and authority, on which they have been predicated. Within these structures, there are certain individuals whose responsibility it is to maintain the authoritative school culture: teachers, administrators, school board members, and legislators have voiced concerns about the structure of the Internet and the power that it places in the hands of the user. As the appointed leaders of the schools, it will be building level administrators who bear the greatest responsibility for the melding of these divergent cultures into one.

Yet despite the fundamental differences between the culture of the Internet and the traditional culture of schools, "we are well along in a process of bringing these two sets of opposing values into very, very close proximity" (Hodas, 1994, p. 3). Hodas (1994) reports that the United States has the greatest number and the highest percentage of networked classrooms in the world, and the percentage is growing rapidly at all grade levels.

Since 1994, the National Center for Education Statistics has conducted annual surveys of a nationally representative sample of public schools in order to assess progress toward President Clinton's goal of connecting all US public schools and every instructional room to the Internet. The data reported in the February 1998 report indicate that the percentage of public schools in the United States with access to the Internet increased from 35% in the fall of 1994 to 78% in the fall of 1997 (National Center for Education Statistics, 1998). Even more significant, however, is the dramatic increase in the number of instructional rooms (defined as a classroom, computer lab and/or library/media center) with Internet access. In 1996, 5% of the school surveyed had no instructional rooms connected; 43% had one room connected; 26% had two, three of four rooms with Internet access and 25% had five or more rooms connected to the Internet. In 1997, the study found that: 2% of instructional rooms had no Internet access; 31% had one room with access; 23% had two, three or four rooms connected to the Internet; and 43% had five or more instructional rooms with Internet access (National Center for Education Statistics, 1998).

In order to examine the characteristics of schools having access to the Internet, the study also collected data relative to instructional level, enrollment size, type of community, geographic region, minority enrollment and poverty levels. The data indicated that secondary schools (89%)

were more likely to have Internet access than elementary schools (75%). The larger the size of the school's enrollment, the more likely it was to be connected to the Internet (less than 300, 75%; 300-999, 78%; 1,000 +, 89%). The study found no significant variance between schools based on the type of community in which they were located (city, urban fringe, town, rural) though it is interesting to note that whereas towns were reported as the most under served of the four types of communities in 1994 (29%) they were the most highly served type of community in 1997 (84%). This corresponds to a growth rate of 55%. The second largest growth rate over this four year period occurred in rural districts (45%), followed by the urban fringe (40%) and cities (34%). From a geographical perspective, regions with access to the Internet could be ranked as follows: Southeast (84%); Central (79%); Northeast (78%); West (73%) (National Center for Education Statistics, 1998).

With regard to school-based demographic variables, two inverse relationships were found. Analysis of minority enrollment data indicated that as minority rates increased, access to the Internet decreased. Schools with 50% or more minority students (63%) enrolled lagged behind schools with 20% or fewer minority students (87%). Similarly, as poverty rates increased, the percentage of schools with access to the Internet decreased. Whereas 88% of schools with less than 11% of students who qualify for free or reduced-price lunch had access to the Internet, only 63% of schools with 71% or more poor students had Internet access. However, schools with 31%- 70% poor students have recently made considerable gains in Internet access, moving from 58% in 1996 to 78% in 1997 (National Center for Education Statistics, 1998).

With regard to anticipated access, the National Center for Education Statistics (1998) reported that "Administrators from schools of all types in all regions of the country reported

moving to secure the new technologies" (p. 3). Data obtained from the 1996 survey indicated that 87% of schools that lacked Internet capabilities planned to obtain Internet access by 2000. If this objective is realized, 95% of all public schools in the United States will have Internet access by the year 2000.

The authors of the study are careful to note, however, that acquiring a connection to the Internet is only the first of several challenges facing educators responsible for use of telecommunications. Four additional challenges include: providing technical support for networks, hardware and software; ensuring the time for and access to staff development opportunities designed to address issues of technology integration; promoting effective use of Internet resources to enhance teaching and learning; and protecting students from inappropriate material on the Internet. Furthermore, the importance and immediacy of these challenges will continue to increase as more schools acquire access in instructional rooms, and as schools obtain connections that are better and faster than traditional modems. (National Center for Education Statistics, 1998).

In a study of educational technology by state, Quality Education Data (1997) reported that New Jersey ranked 19th in the nation in the number of students per computer. Data specific to the state of New Jersey found that there was an average of 8.9 students per computer and 10.1 students per multi-media computer. There was a total of 136,229 computers for the state's 1,207,047 students. Of the state's 2,336 public schools, 652 had networks, 793 had modems, 51 had on-line addresses. Overall, New Jersey received a Technology Measurement Status of "Medium."

Data for Warren County, New Jersey may be found in The Warren County Technology

Plan presented in August of 1997. Included in the plan is a technology survey that gathered information regarding the number of computers for instructional use, the number of computers for administrative use, whether the district has access to the Internet, the number of computers with Internet access, and the type of connection(s) to the Internet. Of the 24 districts in the county, 22 had access to the Internet from at least one location. While 6 districts had high speed, direct connections to the Internet through ISDN or T-1 lines, 14 districts had only dial-up modem connections, the slowest of all connections to the Internet. Two districts had both direct and dial-up connections to the Internet. A total of 71 classrooms were connected to the Internet. Of the 2,877 computers in the district, 2498 were for instructional use and 379 were for administrative use. Although the district plan boasts a 4:1 computer to student ratio, described as "the most favorable student to computer ratio in a New Jersey Department of Education Survey," a footnote in fine print notes that "It must be pointed out that many of the computers are of an earlier generation" and will need to be replaced with more advanced hardware.

An important supplement to the question of who is using the Internet is what are they using it for? An analysis of on-line district applications of the Internet found "Information Research" to be the most commonly cited application (66%), followed by "E-mail" (62%), and "Curriculum Instruction" (34%) (Market Data Retrieval, 1996).

In its 15th annual survey of public school ownership of educational technology, Quality Education Data (1996) reported that projected allocations of district resources for technology related expenditures suggest a continued commitment to increase Internet access in public schools. The Quality Education Data study found that: 65% of districts plan to spend more on equipment such as computer processors, printers and networking supplies, compared to 50% that

upped hardware budgets last year; 34% plan to increase software spending; the average district plans to spend about $92.70 per student on technology this year, up from $90.17; and spending for on-line services will increase from $1.73 to $2.63 per student. In total, districts plan to spend an estimated $4.1 billion on school technology this year, a 2 million dollar increase over the 1995-96 school budget.

Despite what appears to be a tremendous investment, today's students spend an average of only a few minutes a day using computers for learning (Getting America's Students Ready for the 21st Century, 1996). Wilson (1995), however, predicts that the next "great wave" of growth on the Internet will come from the K-12 community. Estimates show that roughly 4 million children between the ages of 2 and 18 are now on-line, with the number expected to quadruple by the year 2000 (The Children's Partnership, 1994). The Digest of Education Statistics (National Center for Education Statistics,1997) reports that approximately 25% of elementary school children used computers at home, though only 11% used them for schoolwork. About 50% of students at the high school or undergraduate level use home computers for schoolwork. Students in higher income families (45% in the 75,000+ income bracket) were more likely to use computers at home and use them for schoolwork than students from lower income families (13% in the $25-29,999 income bracket).

Significant differences in computer ownership by ethnicity prompted the authors of Getting America's Students Ready for the 21st Century (1996) to note that "household possession and use of computers and network services is already reflective of a digital divide" (p. 9). Data obtained in 1995 indicated that white Americans were two to three times as likely to own computers as Black or Hispanic Americans, seven times more likely to own computers than

the rural poor, and four times more likely to own computers than the urban poor, whatever their ethnic background.

Role of the Principal

> Administrators must understand both the capabilities and limitations of technology. Only then can they plan for, budget for, purchase carefully, install properly, maintain dutifully, schedule adequately, distribute appropriately, and replace systematically the electronic technology best suited for their needs. (Mecklenberg, 1989, p. 7)

In recent years, the overall cost and physical size of educational technologies have reduced drastically, while the speed, sophistication and storage space of computers has increased exponentially. In addition, the educational, pedagogical and administrative benefits have been clearly detailed and documented in the literature. Furthermore, computer initiatives continue to enjoy the fiscal and philosophical support of the public and politicians alike. Why, then, do schools continue to lag in the acquisition and application of educational technologies?

Malarkey-Taylor Associates conducted telephone interviews with 1000 elementary and secondary educators in the Spring of 1995 in order to determine usage, attitudes and barriers for five electronic in-school services: Cable in the Classroom; computers, laserdisc or CD-ROM; Internet; on-line computer services such as America Online and Prodigy; and Channel One. A prerequisite for inclusion in the study was the presence of cable in the classrooms. A total of 600 teachers and media coordinators, 300 principals and 100 school district administrators were surveyed. Data obtained from principals and district administrators indicated strong support for the importance of on-line and Internet services for the preparation of young people for life in an information age, for the exchange of information, and as a means to provide support for the community and professional development of teachers.

Several barriers, however, were identified by administrators as significant in their deleterious effect on integration of electronic services in schools: 80% percent of principals reported a lack of knowledge about service, lack of workshops or training, lack of time to learn how to use, lack of access to equipment, lack of access to telephone, cable or data line in the classroom, and lack of funds for schools to purchase service; 60% said lack of class time for use; 30% indicated lack of motivation on their part; and 15% suggested lack of relevance to the curriculum. The authors of the study found that educator's perceptions of each electronic service seemed to be influenced by the extent of their training in that particular area.

For many educators, a lack of training and experience with computers may result in feelings of inadequacy and active avoidance of computers. Russell (1996) contends that an understanding of the stages that adults pass through as they learn to use technology may be instrumental in addressing the affective as well as cognitive challenges that people face as "the technology moves from being intrusive to becoming invisible" (p. 634). In a qualitative study of adults who were learning to use E-mail for the first time, Russell (1996) used the metacognitive reflections of thirty teachers in a post-graduate university course to identify the following six stages of technology-related learning: awareness, learning the process, understanding and application of the process, familiarity and confidence, adaption to other contexts, and creative application to new contexts. Russell (1996) found that as adults moved from stage one to stage six, a predictable series of emotions, ranging from fear to frustration to confidence, tended to be associated with increased familiarity with the technology. Perhaps most salient to this study was Russell's finding that only individuals at stage six, the highest level of learning, were able to achieve a vision of how the technology could be used for other

educational purposes. This is an important consideration in light of the numerous articles that identify the ability of the principal to articulate a vision as critical to the success of any technology-related initiative.

Although there is a considerable body of literature that prescribes certain behaviors or strategies for principals charged with the introduction of technology in their schools, much of it is expository in nature. One notable exception is the study conducted by the Southern Technology Council in 1997. Data collection in this comprehensive study involved a 16 page survey instrument that covered implementation practices, as well as the extent of technology use, perceived impacts, and structural and curricular reforms. The majority of the 94 questions addressed the key issues facing schools in the process of integrating technology. These issues were organized into seven domains: planning, training, technical support, change strategies, organizational redesign, leadership and resources. Survey data were supplemented with one to two hour telephone interviews with school personnel. The intent of the interviews was to uncover unique solutions to the problems associated with technological change so that a compilation of "best practices and policies" could be assembled and distributed to schools.

One of the key findings of the Southern Technology Council (1997) study was that, "Exceptional leadership is a common denominator for schools and districts successfully implementing technology" (p. 98). Whether the nature of the leadership was direct or delegated, principals were determined to play a critical role in technology initiatives. The best practices data collected during interviews with a large national sample of schools clustered around four dominant themes: vision; empowering others; modeling technology use; and interacting. The visionary leaders were adept are articulating a vision, communicating their beliefs to various

constituencies and "infecting others with their contagious enthusiasm" (p. 100). The empowering leader removed barriers, rewarded technology achievers, and encouraged participatory decision-making and risk-taking. Administrators who actively used technology for a variety of administrative or instructional purposes became influential models of creative computer use. Finally, effective leaders attended to the human dimension of technology integration by interacting personally with "front-line implementors."

The leadership section of the questionnaire included nine leadership approaches commonly described in the educational literature on technology. The authors asked respondents to indicate whether they were using a particular approach and to rate how much the approach helped on a four point scale. The nine leadership approaches received the following " % Used" and "Mean Indicator of Helpfulness:" "Administration demonstrated concern about access to computers for all students," 97.6%, 3.8; "Administration identified a "champion or technology leader in the school who had responsibility for managing the change process," 94.7%, 3.7; "Administration actually used the technology in administrative and/or instructional settings" 93.7%, 3.7; "Administration addressed teachers and staff fears and anxieties abut technology," 92.3%, 3.4; "Administration created and empowered a group within the school to oversee and manage the change process involving educational technologies," 91.4%, 3.6; "Administration held regular meetings to review progress relative to the technology plan," 87.4%, 3.4; "Administration linked to the community, parents, and/or corporate leadership to support and participate in technology implementation," 82.6%, 3.3; "Administration tracked progress in implementation of education technology," 77.0%, 3.4; "Administration developed a presentation about the school's technology efforts," 72.8%, 3.5. The authors noted that of all the domains

included in the study, these nine questionnaire items yielded some of the highest overall helpfulness ratings and some of the highest percentages of "Helped A Lot" ratings (a score of 4).

In order to examine the relationship between technology use in a school and the number of leadership approaches employed, the team compared the aggregate leadership index (the sum of the number of different leadership approaches used) to a composite measure of general technology use and a composite measure of telecommunication use. The authors reported a moderate correlation between the leadership index and the general technology index, and a negligible correlation between the leadership index and the telecommunications index. Possible reasons for the difference in the strengths of these relationships were not provided.

In another study of technology rich schools, Glennan and Melmed (1996) found that four key features tended to characterize best practices of high technology use. The first was the role of "concentrated, conscious, and explicit planning among school leaders, families and students to create learner-centered environments" (p. 7). Here, the focus remained on how technology can support students' individual needs rather than the capabilities of the technology itself. As a corollary to this planning process, "the goals and challenging standards for student achievement are clearly articulated" (p. 7). Included in the definition of student success were measures of student motivation and engagement, job placement, attendance rates, dropout rates, and level of family involvement, as well as achievement test scores. A third feature emphasized, "the restructuring of the school to support the learner-centered environment and achievement standard." (p. 9). In successful technology-rich schools, classrooms and the school's organizational structure were redesigned to revise use of time, delivery of curriculum, and special education services. The final feature common to technology-rich schools was "near

universal access to computer technology." In order to accomplish this, successful schools tended to spend three to five times as much on technology-related costs than average schools.

Ross (1996) proposes that in order for schools to benefit from the educational enhancements made available through connectivity, building leaders must adhere to the following "formula for effective connectivity":

H(SC) = Effective Connectivity.

In this formula: H= Hardware; S=Software; C=Curriculum; S=Staff Development and C= Control. Ross writes that in addition to the hardware needed for connectivity, administrators must know the software needed to optimize its use. Once understood, administrators can facilitate ways to use the technology to enhance curriculum and instruction. Little, however, will be achieved without four critical aspects of staff development- skill development, concept development, on-call support, and a program of delivery that is "on-time," "on-target" and "on-going." The variable of control identified in the formula pertains to communication among students, and between students and people outside of the school.

Ross (1996) notes that networking and connectivity present new areas of administrative concern with regard to the issue of control.

> Networking and information connectivity are diametrically opposite to the contact limiting strategy practiced by schools. Internet access gives students contact, via computers to all sorts of information - the good, the bad and the ugly. From school computers students can log on to great literature, recent photos from the Hubble Telescope, or research institutions at the highest levels. They can also connect to pornography, illicit drug sales or hate literature. Administrators who "fling open" the school electronic doors need to prepare for this new environment. (Ross, 1996, p.10)

Hawkins (1996) writes that the challenge presently facing administrators is not one of control, but rather how to use existing and emerging technologies to increase student

achievement and foster school improvement. "Technology can no longer be treated as a separate issue for schools, or as the sole solution to difficult problems. It now must be thoughtfully used to realize overall goals for improvement. This is a time of transition" (Hawkins, 1996, p. 1).

Hawkins (1996) describes three critical transitions that must take place in order to take full advantage of telecommunications and multimedia technologies: a transition from stand-alone hardware to connectivity, a transition from isolated skills practice to integrating technologies throughout the disciplines, and a transition from inadequate preparation of teachers to the ability of all teachers use technologies effectively in their teaching.

Since the latter two transitions have been thoroughly discussed in the literature, attention to the first appears warranted. Hawkins (1996) writes that in order for the transition from stand-alone hardware to connectivity to take place, four key elements must be addressed. First, outdated hardware needs to be replaced by computers that have the capacity to take advantage of multimedia and connectivity. At the same time, computers need to be moved out of computer labs and into classrooms if they are to truly effect teaching and learning. Second, a different type of budgeting process that provides a long-range, planned program of replacement, upgrading and costs associated with regular use of telecommunications needs to be developed. Next, effective technology planning requires that proper attention be given to all of the categories of technology implementation. Hawkins asserts that in the effort to infuse large amounts of hardware in schools, far too little has been spent on training, software and technical support, areas critical to the success of any technology initiative. Finally, Hawkins advocates the establishment of alliances within the public school system in order to create regional purchasing consortia that

can reduce the price of hardware, software and professional training.

In a study of information skills programs in the US, Britain, Scotland and Australia, Kirk (1987) found that the school principal plays a critical role in each of the two key elements that define effective information skills programs: an integrated approach to information skills learning and effective resource selection and management. With regard to the first element, Kirk reports that by involving staff in the development of school policies, by arranging for professional development and inservice courses for staff, by demonstrating leadership within the school and supporting staff initiatives, and by encouraging a school climate that is conducive to open communication and successful teaching and learning, the principal is able to infuse technology into the curriculum. With regard to the second key element, Kirk found that "resource based learning was dependent on resources." As the chief decision maker regarding the allocation of resources, both in terms of money and personnel, principals exerted a significant influence on both how and what students learned.

The Office of Technology Assessment has found that administrators who are informed and comfortable with technology become key players in leading and supporting technology in the schools (OTA, 1988; 1989; 1995). Kirk (1987) cites a study conducted by Sneath in London which found that the enthusiasm of the principal was one of the leading factors to be considered when implementing information skills across the curriculum, followed by enthusiasm and interest of staff and librarians, the school environment, the stability of staff and the availability of resources.

The role of the principal in the management of school resources and its effect on computer integration was a major finding reported by the US Advisory Council on the National

Information Infrastructure in its 1996 report, KickStart Initiative: Connecting America's Communities to the Information Superhighway. In the section entitled, "Galvanizing the Stakeholders" the council writes:

> Educators -- especially principals and teachers -- have perhaps the most important role of all stakeholders. Because they are often the most visible personae when students, parents, administrators, and members of the community are introduced to the Information Superhighway and make their assessment of its importance and power, these stakeholders are critical to the national connectivity goal. (US Advisory Council on the National Information Infrastructure, 1996, p. 5)

To this end, the council recommends that educators address legislative bodies and convey the importance of school connectivity; provide all children, particularly those who cannot afford technologies at home with the ability to use information technologies; build partnerships with organizations and institutions outside of education in order to promote lifelong learning; develop access and acceptable use policies; provide technology training in staff development programs; and encourage the ethical and practical application of networking skills (US Advisory Council on the National Information Infrastructure, 1996).

Although the authors of the KickStart report discuss the role of the principals and teachers as one, there is reason to believe that the influence of the former may affect the extent to which the latter is able to fulfill its role as "stakeholder." As part of a series of studies that examined various teacher variables in relation to teacher computer use, Marcinkiewicz (1994) found that teachers' perceptions regarding expectations for their behavior held by significant others in their professional environment exerted a significant influence on their use of computers. Results indicated that subjective norms were predictive of teacher computer use and that principals, colleagues, students and "the profession" are influential in developing

teachers' expectations of their own computer use.

A similar finding was reported by Becker (1992). When asked to identify the reason why they had first gotten involved with computers, an overwhelming majority of secondary level subject area teachers reported that it had been their "own choice." At the same time, however, a substantial number reported that it was the expectations of others that led them to do so. Thirty seven percent of elementary teachers reported that "expectations of others" was their main reason for first using the computer. Within this group, the individual most often specified was the principal. Becker found that once introduced, however, this effect appears to diminish. Far fewer teachers cited "expectations" as governing their current use of computers than as their main reason for initiating computer use.

Stuhlmann (1994) conducted a study to investigate the disparity between the availability and utilization of computer resources. Stuhlmann found that although teachers had training, support and access to equipment in their classrooms, in the two years following their participation in a statewide telecommunications project, some were not taking advantage of available computer resources. In a cross-case analysis of three high versus three low users, Stuhlmann found that teachers who were integrating telecommunications into their teaching practices valued the use of interactive learning, figured out how to use it instructionally, received support from other users, and had access to computer equipment at home. Circumstances and experiences that did not appear to impact on use were the number of computers in a school and the principal's knowledge and interest in telecommunications. Stuhlmann reported no corresponding patterns between principals' and teachers' levels of use. In addition, Stuhlmann found no relationship between principals' leadership style and the nature and frequency of

teacher utilization - low users were equally likely to have principals who mandated teacher participation in telecommunications workshops as those who left training and use to teacher discretion.

With regard to the extent to which a principal's knowledge of technology affects his or her own use of computers for administrative purposes, Witton (1990) found a very different result. In a study of secondary principals in Kentucky, Witton found that the vast majority of administrators did not have a computer at home (86%), did not have any formal computer training (79%), and had never taught a computer class (92%). In a survey of the same population, Witton found that although most principals admit to a backlog of paperwork, few were willing to consider changing their system of management to incorporate newer and more efficient office automation systems. Of 154 principals surveyed, only 24 (16%) reported being "Very Committed" to administrative computer use, while 56% were "Somewhat Committed" and 28% were "Not Committed." Witton identified several factors which appear to contribute to the paucity of principals who are willing to alter their management style in spite of the promise of increased efficiency: a lack of understanding of how a computer could be used as a tool to enhance personal productivity, a lack of funding to purchase computer hardware and software, a lack of formal training or district provided inservice, lack of planning and commitment to computer use for administrative purposes, no centralized computer coordinator to assist principals in learning how to use and apply office-based management systems, and a reluctance or inability to accept change.

Yet perhaps the most commonly cited reason for principals' lack of technological proficiency is time. Ironically, Roberts (1997) suggests that time is both a barrier and a benefit

associated with administrative use of computers. Although effective utilization of E-mail, search engines, word processing, and database and presentation software can add ease and efficiency to the completion of administrative functions, principals often report that they do not have time to become proficient in the use of such desktop technologies (Roberts, 1997).

Whitworth (1989) contends that of all administrators, principals of small, rural schools stand to benefit most from effective use of computers. Whitworth notes that the increasing complexity of school administration caused by the "virtual explosion of legislation, regulation and information has added an entirely new dimension to the field of educational management" (p. 26). In small schools, where a single administrator must fulfill every management function, use of computerized accounting software, E-mail and integrated software programs that include word processing, spreadsheets and data management capabilities, can make the management of school affairs more effective and efficient than ever before.

Despite the advantages offered by computer utilization in rural districts, an early study of administrative computing in rural schools, found that 56% of rural administrators did not use a computer for administrative tasks (Picton, 1988). A survey of 700 rural administrators, including elementary, middle and high school principals and superintendents found that of the 560 respondents, 43% stated that they had no computer training. Picton also reported that: gender was not a factor in computer use; younger administrators were more likely to use computers for administrative tasks than their older counterparts; and although there was no relationship between size of the school district and computer use, computer use could be ranked from highest to lowest according to type of administrator -- elementary principal (highest), middle school principal, high school principal and superintendent (lowest).

In a recent study of the factors affecting the use of E-mail by public school principals of the Central Appalachian Region, Carter (1997) found that 59.7% of respondents reported using E-mail. The study provided survey data from 375 respondents on demographic variables, accessibility to hardware and software, experience and training on computers and E-mail, uses of E-mail, and factors influencing the use or non-use of E-mail. Carter reported that there were no differences between users and non-users with respect to age, gender, highest degree earned or total years of educational experience. Factors found to predict E-mail usage included previous computer experience, accessibility to resources, and training. Keyboarding skills and use of E-mail by superiors, fellow principals, or teachers were not found to be indicators of E-mail use.

Carter (1997) found that for users of E-mail, availability of resources such as access to computer hardware and software, availability of a consultant, ability to learn the E-mail system, and training were the main factors that influenced use. For non-users, comfortableness was the main factor that inhibited use. Comfortableness included such items as difficulty of software to learn, insufficient computer training, typing proficiency, and ability to learn the E-mail system.

Several studies confirm the relationship between comfort level and computer use (Carter, 1997; Russell, 1996; Wilson, Ryder, McCahan & Sherry, 1996). Confidence in the use of technology is enhanced by experience, which, whether measured in years of usage or level of computer skill, is associated with use. The challenge for administrators is how to acquire computer skills and lead effectively without becoming overwhelmed by the new technologies (Ross, 1996). Carter (1997) suggests that in order to reduce anxiety and promote the use of computer resources such as E-mail, administrators require three kinds of support: technical

support that maintains the operational integrity of the system, moral support that builds confidence, and functional support that produces educationally appropriate uses and benefits.

Administrative support, therefore, may be alternatively defined as that which is provided to administrators (Carter, 1997), and that which is provided by administrators (Southern Technology Council, 1997). It is interesting to note that while many articles in the educational literature acknowledge the importance of one or the other or form of administrative support, few recognize the significance of both.

In a study of the locus of decision-making and its effect on computer acquisition and use, Becker (1992) found that "top-down" initiatives (led by a principal and/or district or state administrator) were consistently associated with the desired outcomes of computer-based education: more computer using teachers, more staff development activities, more widespread community support for school computing, more up-to-date computer hardware and software, heavier use of computer equipment, more curricular rather than recreational use of computer time, and more use of computers as academic tools than as a means of basic skills practice. "In every case it is not independent teacher decision-making that is related to these outcomes but (a) substantial district-level involvement in school-level decision-making and (b) the active presence and leadership of a school-level computer coordinator" (Becker, 1992, p. 25).

Results of an earlier study, however, suggest that if the implementation of computers had followed the traditional top-down, hierarchical approach, it could not have kept abreast of rapid technological changes and might have become overly constrained in its application. In an ethnographic study of six exemplary elementary classrooms, Cohen, Levin & Souviney (1986) found that successful implementation of computers was the result of an enthusiastic teacher who

became the "computer expert" and a supportive principal who in most cases did not know about computers but realized their potential. This "grassroots" introduction of computers was found to be associated with higher levels of computer use and more diverse applications of the technology.

The most positive results, however, may occur as the result of a knowledgeable principal and a technologically skilled teaching staff. In a study of the introduction of computers into two comparable elementary schools, Levinson, Doyle and Benjamin (1993) attributed the significant increase in standardized test scores in one school to the principal's introduction of a computer-based curriculum and integrated learning system. The authors contend that the laboratory approach in the partner school proved unsuccessful as a result of the principal's attempt to "graft new technology onto the regular school operation without changing the organization of the school or its instructional process" (p. 20). Levinson et. al (1993) assert that for technology-based change to work, the principal must understand the technology, know the school's instructional and organizational process, and acquire leadership and political skills to manage the change process.

Yet perhaps the most comprehensive analysis of the use and helpfulness of recommended change strategies was conducted by the Southern Technology Council (1997). From the eleven change strategies derived from the literature on educational technology, and from the fields of technological innovation and social change, the authors asked respondents to indicate whether they were using a particular technical support strategy, and to rate the degree to which the approach helped on a four-point scale. Each change strategy and the resultant questionnaire data is as follows: "Got administrative support early in the process," 99.4%, 3.8;

"Used technologies for non-teaching as well as instructional applications," 98.1%, 3.7; "Consistently used computers for "real life" applications with students," 92.6%, 3.5; "Got parental support early in the process," 89.6%, 3.4; "Used an "incremental" strategy for implementation," 89.3%, 3.6; "Started with a computer lab, then transition to technology in classroom," 84.8%, 3.6; "Adopted a "total immersion" approach to introducing technology," 78.8%, 3.5; "Used a "bottom up" approach to important decisions," 76.3%, 3.5; "Used a "top down" approach to important decisions," 74.8%, 3.2; "Adopted a total-quality-management approach to using technology," 69.5%, 3.5; "Got corporate support early in the process," 65.6%, 3.1

From the eleven change strategies, three aggregate change strategy indices were developed by "combining variables in the domain that hung together during factor analysis" (Southern Technology Council, 1997, p. 73). The three indices were strategies based on: obtaining external support (e.g., parental support, corporate support), use of practical applications (e.g., real life applications), and incrementalism (e.g., started with a computer lab and then transitioned to technology in the classroom.) Whereas the authors reported relatively high correlations between a composite measure of general technology use and the indices of incrementalism and practical applications, and a negligible correlation with creating external support, negligible correlations were found to exist between all three change strategy indices and an aggregate measure of telecommunication use.

Critical to any change initiative is an understanding of the context in which the change is intended to occur. Wang, Johnson and Pisapia (1994) examined the effect of sociological context (i.e. rural versus urban setting) on the choices made by schools in the acquisition and

integration of computers. In order to compare the two settings, the authors merged observational data with interview data to "create a composite picture" of how technology was being integrated within each school. The three areas of inquiry included an organizational profile (belief/vision, planning, implementation), a technology profile (hardware/software, instructional applications, degree of integration), and a human resource profile (training opportunities, support systems, administrative usage). The authors report that despite the differences in urban and rural settings, certain similarities exist: an adaptable culture or climate, a belief that technology should be an integral part of the educational process, the presence of a media center coordinator, a core of technology using teachers, the need for more time and training, and strong administrative support. Variations in computer utilization that could be traced back to contextual differences included: the locus of leadership – in the rural context, an off site administrator was the "visionary" while in the urban setting leadership came from the building level administrator; articulation of a technology plan – classrooms in the rural district operated autonomously while in the urban district a detailed technology plan included extensive integration and standardization of computing resources in the school; the issue of training – in the rural context, training was conducted informally through individualized sessions by lead teachers or the media specialist; in the urban district, formalized inservice training programs and release time were used for teacher training; and diffusion of technology – in the rural school, word of mouth was used to share ideas and promote integration while in the urban school a computer committee met weekly to discuss computer related issues and address problems.

Ritchie (1996) suggests that regardless of the context in which a school operates, the underutilization of computers centers around one or more of eight variables: a lack of

administrative support; inadequate staff development and technical support; low quantity, quality, and access of technologies in the classroom; nonexistent or cursory plans for adopting and implementing technologies into schools; the failure to allocate a technology coordinator to help train teachers and coordinate technologies; a lack of funds and personnel to maintain equipment; continual assessment of content acquisition through traditional methods; and the absence of a broad participatory clientele to establish a technology culture. Ritchie suggests that of these eight variables, lack of administrative support may be the most critical, "for without the commitment of a school administrator, the likelihood is increased that one or more of the other seven variables will negatively influence technology adoption and implementation" (1996, p. 43).

Hoffman (1996) uses slightly different terminology to identify a similar list of eight variables that influence the use of technology in schools. Hoffman suggests that in order to create an environment in which new and experienced teachers receive the support they need for using technology in their classrooms, principals must communicate the "managerial expectation" that teachers will use computers and provide incentives in the form of recognition, opportunities for professional development, and financial rewards for those who do. Administrators can also hire and promote individuals with technology skills, incorporate technology into restructuring initiatives and curricular objectives, and ensure that adequate resources for technology and staff development are available.

A study conducted by the US Advisory Council on the National Information Infrastructure (1996) found that administrators who achieved connectivity for their school were successful because they communicated a vision that conveyed "the importance and relevance of

connectivity to the broader community and encouraged others to share that vision." (p. 4). Beyond that, administrators reported that the development and implementation process also required that they: make connectivity a major institutional priority and rededicate existing financial, technical and personnel resources to connectivity projects; develop strategic plans that incorporate the "life cycle of technology" with respect to hardware, software and training; initiate partnerships with others in the community in order to obtain additional resources; establish a group, including a facilitator, to coordinate connectivity logistics; create a full-time project management position; identify and apply for grants available from the public and private sector; provide release time so that employees can learn to use the technology and tie rewards or incentives to the realization of connectivity goals; and initiate ongoing technology training programs that provide the time and resources necessary for staff to master existing technologies.

The importance of staff development in the successful integration of computers into schools is impossible to underestimate. According to the Office of Technology Assessment (1995), the lack of teacher training is one of the greatest roadblocks to integrating technology into the curriculum. The majority of teachers in classrooms today completed their professional training before the emergence of computers into the public arena (Armstrong, Davis, & Young, 1996). Consequently, many current educators who are being asked to use technology in their classrooms are unprepared to do so. Principals must provide teachers with ample opportunities to learn, practice and apply newly acquired technological proficiencies both inside and outside the classroom (Armstrong, Davis & Young, 1996; Niederhauser, 1996; Ritchie, 1996). Hoffman (1996) cites several studies that suggest that one of the most effective ways to foster computer use in schools is to encourage teachers to use computers at home. One way to accomplish this is

for principals to allow teachers to borrow computers while school is not in session.

Shelton and Jones (1996) identify four factors of staff development as critical to the successful integration of technology into the curriculum: time, training, technology and teacher-type tasks. Principals play a pivotal role in determining the nature and frequency of inservice opportunities. According to Shelton and Jones, training should be "hands-on," ongoing, developmentally appropriate with regard to individual needs, professionally relevant and geared toward curricular integration rather than specific applications.

Although a lack of training and support in the use of new technologies may account in part for the paucity of its use, Bossert (1996) suggests that it is in fact the existence of other "invisible technologies" that creates powerful disincentives for its incorporation into the traditional school culture. "The majority of the technologies that enable and constrain our ability to reform organizational behaviors, restructure institutional policies and procedures, and renew academic curricula operate as an intricately interlinked series of conceptual "boxes" in which we have placed ourselves" (p. 16). Some of the "boxes" that inhibit meaningful change include: architectural boxes - learning spaces in school structures are not designed or equipped with the electronic infrastructure necessary to accommodate new information technologies; scheduling boxes - time periods of arbitrarily designated lengths constrain learning but facilitate the ability to manage, evaluate and accredit schools; academic boxes - subject areas "divide up the experiential content of learning into unrelated events and artificial groups" (p. 17) that are further broken down into school "classes" based on chronology rather than ability; and evaluation boxes - standardized testing and traditional evaluation techniques "almost guarantee that any deviation from the standard educational delivery technologies will result in lower test

scores for students and, as a result, for the schools those students attend" (p. 18). Together, these "boxes" define and determine what is done in schools. In effect, they operate as a system of checks and balances that serve to resist change and maintain the status quo.

Ritchie (1996) writes that motivating and convincing the faculty to abandon traditional methods of instruction is one of the most difficult challenges facing administrators who support the restructuring of education through the incorporation of technology. Ritchie describes the effort to mobilize the educational community as a three step process. "Successful transitions occur when leaders articulate and share a vision; exemplify the change through example; and educate, support, empower, and share decision making and leadership with faculty and staff" (p. 48). Ritchie suggests that articulating the vision is often the most difficult step for administrators because it requires great skill to meld the divergent viewpoints of the various "stakeholders" into one unified vision. Once a vision is created and accepted, Ritchie stresses the importance of "leading by example." By modeling the usage of technology to accomplish daily tasks, principals communicate a genuine commitment to their stated goals. Finally, principals must make a "substantial investment" in their human resources by providing the training and support necessary to make the vision a reality.

Bennett (1996a) suggests that in order to effectively plan, implement and maintain a technologically integrated educational program one must first consider the environmental framework in which the program will exist. According to Bennett, this framework consists of both internal and external environmental factors including socio-political influences (school board, parent and teacher groups, business organizations, student characteristics, community culture), legal mandates (federal/state/local laws and regulations or civil court mandates) and

economic conditions (revenue and resources). Even more importantly, however, Bennett suggests that in a technological setting, the effective principal must be highly proficient at performing tasks within each of six categories: defining and communicating a mission, supporting and supervising teachers, promoting an effective instructional climate, managing curriculum and instruction, monitoring student progress and managing technology. Bennett derives the first five categories from an extensive body of research on effective leadership in schools. To this, she suggests, we must add "an essential sixth category" -- the management of technology. "To manage this most important piece of the educational puzzle, principals must know what the various components of a technological educational system are, how much they cost, and what their impact will be on teaching and learning" (p. 63).

How prepared are principals to reconceptualize and redefine their leadership roles within a technological paradigm? Studies have shown that the majority of principals have not had first hand experience using technology in the classroom, nor was technology training part of their administrative preparatory program (Bennett, 1996a; Ritchie, 1996). To date, not a single state requires administrators to demonstrate technological competence (Ritchie, 1996). An examination of current administrative technology training reveals that the vast majority of instruction in institutions of higher learning focuses on how to use the technology with little emphasis on the conceptual or strategic skills required for effective leadership (Kearsley & Lynch, 1994). Ritchie (1996) contends that

> A better way would be to not only help develop technology skills but also focus on the conceptual knowledge of how technologies can be used to augment student learning, and the leadership and strategic skills needed to promote, achieve, and sustain a vision of how our schools can and should evolve in a society that will increasingly depend on creative, technology-using citizens. (p. 45)

Chapter III

Design and Methodology

Introduction

If principals are to assume a leadership role in education reform efforts that will lead to more effective utilization of educational technology in schools, they must be familiar with the technology and conversant in its applications. Without a clear understanding of the Internet, it is unlikely that administrators will be willing and able to make sound decisions regarding appropriate educational applications of Internet access and the allocation of resources that will make this technology available.

The purpose of this study was to examine principals' perceptions regarding the utilization of the Internet in elementary and secondary schools. This investigation sought to examine the personal, educational and institutional factors that affect a principal's ability to address the administrative and pedogical issues associated with providing children with Internet access. Once identified, this study attempted to examine the manner in which these factors contribute to, and manifest in, the leadership role that principals play in the integration of the Internet in public schools.

Description of Sample County

Warren County is located in the northwestern region of New Jersey. Twenty three municipalities, that include 18 townships and 5 towns comprise its 358 square miles of scenic terrain. With a population of nearly 96,500, it ranks 9th in size and 20th in population among

New Jersey's 21 counties. In one of the most heavily populated states in the nation, Warren County, New Jersey remains one of the foremost agricultural counties in the state, ranking first in the production of milk, cattle, corn and eggs (Warren County Cultural and Heritage Commission, 1998).

Warren County is an area marked by slow, but steady growth in population and economy. Since 1970, the county has averaged an increase of approximately 10,000 persons a decade. Per capita income increased from $12,248 in 1983, to $21,656 in 1990. The majority of working adults are high school graduates, employed as technicians, sales and administrative support personnel in areas outside the county. Approximately 95% of the population is white, 2% is Hispanic, 1.5% is Black, and 1% Asian. Of the total population, 5% are considered living at, or below, the poverty level (The New Jersey Municipal Data Book, 1997).

Warren County includes 40 public schools organized into 24 public school districts. Eight private schools, six of which are parochial and two of which are special education, are also in operation. In total, the public and private schools are responsible for educating 1.2% of the state's student enrollment. Only Salem County, located in the southern portion of the state, educates fewer children than Warren County (Market Data Retrieval, 1994).

Analysis of the District Buying Power Index published by Market Data Retrieval (1994) also finds Warren County ranked second to last in New Jersey. When ranked by percentage of state spending, Warren County received 1.51% of the state's education allocation for the 1993-1994 school year. Only Salem County received a lower percentage (1.19%) of the state's funds. Examination of district expenditures, defined as the level of expenditures per student for all instructional materials, indicates that 21 districts were in the "High" range ($120+), 3 were in

the "Medium"range ($85-119) and 0 were in the "Low" range (less than $85). According to the poverty level indicator, which reflects the percentage of school children falling below the poverty line, 4 districts were classified as "Rich" (0-4.9%), 18 were considered "Average" (5-24.9%), and 0 was defined as "Poor" (25%+). (Data on the poverty level indicator was not provided for two districts.)

Description of Sample Schools

The selected schools included two K-8 schools, three middle schools and three high schools. The grade level configuration of the middle schools were as follows: 4-8, 4-6, and 5-8. One of the three high schools was the vocational-technical school which accepts students from districts throughout the county. Two of the randomly selected principals worked in the same school district. Six of the schools had a district factor grouping of DE. One had a district factor grouping of FG. The county vocational school does not have a district factor grouping due to its regional nature.

Description of Participants

Participants in this study included eight principals, one third of the total number of building principals in Warren County. A brief demographic questionnaire administered after the conclusion of the interview provided information about the participants' age, gender, educational background, current level at which they are serving as principal, number of years experience at the elementary, middle and high school levels, and the age at which they obtained their first principalship.

Because this study endeavored to examine principals' perceptions regarding the integration of the Internet into public schools, eligibility for participation was limited to those

administrators who were identified as "Principal" in the New Jersey Department of Education, Warren County Office, 1997-1998 Public School Directory. Of the 24 districts in the county, 12 districts had only a Chief School Administrator (11, K-8 or K-6 schools; and 1, K-12 special services district). The other 12 districts, representing a total of 25 schools, had both a Chief School Administrator and a designated principal. Because one of the principals was identified as the principal of two schools, a pool of 24 principals were deemed eligible for random selection. Of these, ten were selected and eight elected to participate.

The participants in this study included two K-8 principals, three middle school principals, and three high school principals: three were female and five were male. (Of the two who declined to participate, one was male and one was female. Both were principals of a middle school.) One principal was in the 30-39 age range, five were in the 40-49 age range, and two were in the 50-59 age range. The total number of years experience at various educational levels ranged from 15 to 32 years. Six of the principals had between 20 and 25 years experience. The distribution of these years at the elementary, middle and high school levels was largely predictive of the level at which they were currently serving as principal, with one exception: one of the principals who was currently serving as the interim principal of the high school had 22 years experience as a superintendent.

The age at which the participants were first hired as a principal ranged from 29 to 50 years old. Four of the principals received their first principalship between the ages of 40 and 46. There was some variation in the educational background of the eight principals. Baccalaureate degrees included four in Elementary Education, two in Industrial Arts, one in Music Education and one in Special Education. Years of graduation ranged from 1964 to 1984. Masters degrees

included Professional and Secondary Education, Bilingual and Bicultural Studies, Student Personnel Services, Elementary Education, Education, and two in Educational Administration. One principal had two masters degrees, one in Special Education and one in Educational Administration. Graduation from these degree programs ranged from 1971 to 1995. None of the principals had earned a doctoral degree although one indicated additional credits completed beyond his masters degree and one listed supplementary certifications earned since completion of her masters degree.

Research Procedures

Consent for this study was granted by the Chief School Administrator (CSA) of the eight randomly selected districts. After forwarding a letter of introduction that described the purpose of the study, the CSA was contacted by telephone within ten school days in order to determine whether permission to conduct the study was granted (see Appendix A). An abstract of the study was made available for the superintendent following the conclusion of the study.

Initial contact with building principals was made through a formal, written request describing the nature and intent of the study (see Appendix B). Telephone contact was made within ten school days in order to determine whether the principal was willing to participate in the study. Of the ten principals contacted, three requested that the researcher call back in June because they were presently too busy to participate. Follow up telephone contact on the dates requested by the principals yielded one confirmation and one refusal to participate. The third principal provided no reply to numerous requests and telephone messages. Seven of the principals immediately agreed to participate in the study. All interviews were scheduled at the principals' convenience.

The actual procedure involved in this study involved the utilization of a standardized, open-ended, interview instrument (see Appendix C). The instrument was developed in accordance with the content matrix prescribed by Patton's (1990) qualitative research guidelines. Original interview questions were designed to represent each of the content areas: behavior/experience, opinion/value, feeling, knowledge, sensory and background/demographic. Each participant was asked the same set of questions. Pre-established probes were used to supplement initial responses if additional information was required in order to sufficiently answer the question. The use of a standardized open-ended interview instrument in this study allowed the participants to describe, in their own words, their professional perspective and personal perceptions regarding the integration of the Internet into their particular school.

Prior to each interview, the researcher utilized an "Interview Checklist" (see Appendix D) designed to help standardize the interview process. Components of the checklist included items to complete before, during and after the interview. Prior to each interview, the researcher reviewed district documentation relevant to computer technology, gathered all necessary materials, and obtained directions to the location. During the interview, the researcher ensured that the Informed Consent was signed and received, and the beginning and ending time of each interview was noted. After each interview, the researcher recorded observational data related to personal impressions of the participant (i.e. vocal quality, eye contact, body language), a description of the room and seating arrangements, and the presence and location of computer equipment. Finally, a personal, handwritten thank you note was mailed to each participant.

The interviews were conducted according to the time and place suggested by each participant. Seven of the interviews were conducted in the principal's private office. One of the

principals requested that the interview take place in the school library. Interviews varied in length from 25 to 45 minutes. Participants had the option to withdraw from the study at any time prior to, or during the interview. Although two of the participants expressed concerns about their ability to contribute to the study in a meaningful way due to their lack of knowledge and experience in the area of computers, all principals followed through with the interview and appeared to answer each question to the best of their ability. One of the principals invited the district technology specialist to sit in on the interview in case he was, "Unable to answer some of the questions." Although the technology specialist attended the interview, the principal answered all of the questions independently.

Each interview was conducted in a confidential manner and each respondent was guaranteed complete anonymity. A tape recorder was used to record the interview in its entirety. Following the interview, the principals were asked to complete a brief demographic questionnaire and return it to the researcher at their earliest convenience (see Appendix E). All elected to complete the form immediately and handed it to the researcher prior to her exiting the interview setting.

Research Instrument and Techniques for Data Collection

The purpose of this study was to examine the perceptions of principals regarding the introduction of the Internet into the schools in which they lead. As such, a qualitative research paradigm was considered most appropriate for soliciting this kind of personal, comprehensive and in-depth data. A standardized open-ended interview instrument was developed in order to allow for breadth and variation in individual responses while minimizing the effect of interviewer bias and situational variation. The content of the questions was derived from a

comprehensive review and analysis of the literature on educational computing and the introduction of the Internet in elementary and secondary level public schools. Particular emphasis was placed on studies which examined the role of building level administrators in relation to the acquisition, application and administration of computer technologies in schools. The topics addressed in the interview instrument reflect the original research questions that were formulated in response to cogent issues that emanated from the literature review. Specific interview questions were designed to represent each of the six types outlined by Patton (1990): behavior/experience, opinion/value, feeling, knowledge, sensory and background/demographic. Because the topic of this study centered around new and emerging technologies, the time frame of most questions was present or future oriented. Only 1 of the 11 questions requested information about the participants' prior computing experience. The sequence of questions followed Patton's suggestions for beginning with less threatening, descriptive questions about present behaviors, activities and experiences and gradually moving on to more stressful questions that elicit opinions and feelings or assess knowledge and skills.

According to Patton, "For the purposes of qualitative inquiry, good questions should, at a minimum, be open-ended, neutral, singular, and clear" (1990, p. 295). The exact wording of the final draft of 11 questions reflected three revisions in response to numerous suggestions made by Dr. Lindemer, professor of the Qualitative Research Seminar for which the pilot study was originally conducted, and a critical analysis of the utility of the instrument during its initial administration. The majority of modifications involved changes in wording that served to enhance question clarity and ensure that each question satisfied the above-mentioned criteria.

The research instrument was designed to provide a standardized interview in an

individualized setting. Interviews were expected to last approximately 30 minutes. A tape recorder was used to record the interview in its entirety. Following the conclusion of the interview, participants were asked to complete a brief demographic form that requested data pertaining to age, gender, educational background and professional experience (see Appendix B).

In addition to interview data, observational information was recorded by the researcher immediately after exiting the interview location. Observational data included aspects of the physical environment (a description of the room, the seating arrangements, and the presence, type, and location of computer-related technologies) as well as nonverbal communication patterns (i.e. voice quality, physical positioning and expression).

Methodological triangulation was obtained by supplementing observational and interview data with a comprehensive document review. Examination of the Warren County Technology Plan, Local District Technology Plans, individual school technology assessments, technology inventory surveys, budget documents, relevant policies, procedures and practices, grant applications and awards, Department of Education memoranda and correspondence, public relations publications, technology curricula, staff development initiatives, and course offerings and attendance records from computer-related inservices offered by the Warren County Educational Technology Training Center provided multiple sources to cross-check findings and verify results.

Treatment of Data

Data were collected and analyzed according to qualitative research guidelines (Blase, 1986; Patton, 1990). In order to permit a thorough analysis of the interview data, the cassette

recordings were transcribed by a typist onto paper. The interviews were typed verbatim. Data from each question were then analyzed from the perspective of each participant. No formal structure or categorization scheme was imposed on the data. Rather, an inductive analysis was used to extrapolate patterns and meaning from the information gathered. Emergent themes and variations in the content of responses were also examined in relation to demographic factors and the background/experience of individual respondents. Patterns generated through the examination of interview data were then viewed in relation to observational data and district documentation in an effort to triangulate the results derived from various data sources and enhance the validity of research findings.

Chapter IV

Presentation of Data

The following chapter provides a presentation of the data. Responses to each of the 11 standardized open ended interview questions are examined in accordance with qualitative research methods and with respect to the original research questions.

Pilot and Instrument Validation

A pilot for this study was conducted in November of 1996 in one school district in Essex County, New Jersey. All six of the district's principals participated in the study. The purpose of the pilot was threefold: to evaluate the utility of the interview instrument in the field; to determine the degree to which the interview questions elicited information that addressed the original research questions; and to establish the viability of conducting a similar, yet expanded study as a doctoral dissertation.

Instrument validation, although limited by the small sample size, was substantiated by six successful interviews. Each participant answered all questions within the projected time frame. Preliminary data recorded in response to the standardized open ended instrument addressed the research questions developed in this study.

Preliminary Interview Process

The interview process began with a letter to the Chief School Administrator that requested permission to conduct research in the district (see Appendix A). The correspondence included a description of the study and an assurance that data provided by participants would

remain confidential. Permission to conduct the study was obtained through telephone contact made within ten school days of the written communication.

Initial contact with building principals was made through written correspondence (see Appendix B). Of the ten principals contacted, eight agreed to participate, one declined to participate, and one provided no response whatsoever. Interviews were scheduled through telephone conversations. The time and location of the interview were at the discretion of the principal.

Seven of the interviews took place in the principal's office. Three of the principals elected to sit at their desks and have the researcher sit in a chair that was positioned either across from, or adjacent to their seat. Three principals chose to sit at a conference table situated in a separate section of the office. During two of the interviews the principal sat directly across from the researcher, while in the other interview, the principal sat adjacent to the researcher at a round table. During one interview, the researcher and principal sat facing each other on couches in a separate seating area in the office.

One principal suggested that the interview take place in the school library. The principal led the researcher to a large, open room with a comfortable seating area positioned in front of a large window that looked out on the valley. The principal and researcher sat in cushioned arm chairs that were set at a 90 degree angle. Since there was no table available, the tape recorder was placed on the floor.

Once situated, each principal was again asked if he/she would be willing to allow the researcher to tape record the session. All agreed. A small tape recorder was then placed on the table, desk or floor in a place that was sufficiently close to record the interview and yet not so

conspicuously positioned that it would create a distraction.

Each of the eight interviews proceeded without incident. All participants answered every question. After the last question on the standardized instrument was asked and answered, the researcher asked each participant if they had anything else they would like to add. Five elected to offer some concluding comments and three did not. In total, the interviews ranged in duration from 25 to 45 minutes. At the conclusion of the interview, participants were asked to complete a brief demographic form and return it to the researcher at their earliest convenience. All decided to complete the form and give it to the researcher prior to her departure.

Principal Interviews

Of the eight principals interviewed, four had computers situated in a prominent place in their office. The location of the equipment was such that it afforded easy access and it appeared to be readily used (i.e. the system was turned on, there was paper in the printer). Two of the computers had an open application on the screen. Principal W appeared to have been working on a spread sheet. Principal J had his computer open to the E-mail screen. Principal Q appeared to be in the process of printing documents off of his lap top when the researcher arrived for the interview. Principal M had a computer on her desk and although the screen was not visible to the researcher, the principal made reference to frequent and varied use of the computer.

Principal R had a computer set up in a far corner of the office which did not appear to be functional (the keyboard and monitor were not set up in the typical user fashion). Principal R admitted that she was, "The last person in the school to get a computer because I knew I wasn't going to use it." Principal R asserted that it takes her less time to write things than use a computer so she prefers manual recording methods.

Two principals did not have a computer in their office. Whereas Principal E appeared almost apologetic and embarrassed about this fact, Principal H seemed quite proud of it. Principal E informed the researcher that, "Despite numerous requests over the past two years, the superintendent has not given me one." She explained that the superintendent's rationale for not providing either of the district's principals with a computer was that, "the focus of the district has been to give computers to kids and teachers." Principal E noted that because she was not provided with a computer, she had purchased a lap top on her own which she used frequently for various administrative tasks.

As the researcher entered the office of Principal H, he quickly pointed out that there was no computer present. He then commented that he hoped the researcher didn't mind but he had invited his technology specialist to attend the meeting in order to help him with the interview. After gently reminding Principal H that the intent of the study was to examine the perceptions of principals and that his impressions was be fine, he appeared somewhat more relaxed but still chose to have the technology specialist present. During the interview, Principal H answered all of the questions without assistance or direct input from the technology specialist. He did, however, on several occasions look to her for confirmation of facts or affirmation of response. At times, Principal H appeared somewhat defensive about his decision not to use computers. Some sarcasm was noted when he described, "people who make 50 dollars an hour and spend time behind a computer typing letters or reports and are actually proud of themselves." He asserted that such clerical work was the job of secretaries and that his place, as principal, was "out in the hall."

Although the interview with Principal B took place in the library and the researcher did

not have the opportunity to confirm the existence of a computer in his office, Principal B reported that he had a computer in his office, one at home and frequently uses a lap top. Principal B appeared extremely conversant in various computer applications.

Question 1. What is the current status of computer technology in your schools?

The majority of principals answered this question in quantifiable terms of physical properties -- the number of computers or computer labs, the location of computers, types of computer peripherals (i.e. large screen monitors, digital cameras, printers, scanners) and the type of computer wiring and connectivity available in the district. References to the importance of a technology coordinator and the district technology plan in the acquisition of additional computer equipment, establishment of connectivity and training of teachers was mentioned by Principals E, H, M, Q and R. Factors that were identified as having interfered with the introduction or integration of computers included insufficient funds (Principal H), teacher resistance (Principal E), lack of teacher training (Principals E and H), an inadequate computer infrastructure in an old school building (Principal Q), concern regarding protection of students (Principal E) and broken, antiquated or problematic equipment (Principals B, H, J, R). Only Principal W offered specific examples of the use of computer programs and applications in classes.

Principal B: That's not an easy answer. Currently we have approximately 2, a minimum of two computers assigned per classroom, 24 computers in the lab. Administratively, we have computers for everyone. All these computers are tied into a local area network and through an ISDN line. Ninety percent of our computers are on the Internet as well. We have scanners, flatbed scanners, we use still cameras, digital cameras for inputting graphics picture, of course, laser and copiers throughout the building and being on a local area network, if a printer's down, we can send data to another printer which makes things a little more easier.

Principal E: At this point we've been working for the last two years with a technology committee and we're meeting probably monthly a lot of times to develop the technology plan. We just finished, a week ago, safety precautions at one point. Two years ago, we hired a

technology consultant/teacher. We hired more on her people skills than her technology skills. Interviewed a lot of people and there are a lot of people with a lot more technology skills than the person we hired. However, they didn't have the people skills. Our concern was getting our teachers to buy into it and train our teachers, cause if we weren't training our teachers, then we weren't going to be able to use it in the classroom, and that was our central focus. Last year we put two computers in every classroom. Actually, the year before last, and a printer. I had teachers that said to me, I refuse to have a computer in my classroom. We talked about this before we even brought the computers in. We kept the lab set up cause that was something, we were going to take the lab down and divide the computers. We kept the lab up which was a great idea because we kept giving the teachers in-service. We gave them time during their school day. We got subs to go in during the classrooms. They felt more comfortable having it with our person. I think that's our biggest focus right now in technology. Getting the hardware, the software, and having this person coordinate everything. I have to spend a lot less time researching technology because now we throw everything to her.

Principal H: We have an awareness of what our kids need and should have and we know what other schools are doing. We're not anywhere near where we should be. Lots of money has not been put into the budget in previous years, and as a result, the people who have been hired to move our technology plan have really not been able to do it because our resources are not there. So we are behind. This year's budget will include approximately a quarter of a million dollars for technology but we are light years behind districts like (District X). We have not enough labs, the equipment we have in our classrooms, most of them have not been working. We are not using the technology as appropriately as we could. We are just getting students on the Internet now. Teachers are beginning to have an awareness of how to use the technology for enhancing instruction. But without ready access to the equipment and software and the networking, it's just not going to get done.

Principal J: We're running right now about 165 systems on T-1; all of the systems are in some form of windows whether it be Windows 95 or Windows 3.1. We're currently installing a T2 line. We're looking into that. We will become a service provider for the Internet for different schools in the county also. I would assume after September I'll be up over 175 or 180 systems on the Internet. We run different networks. I have a MAC network, which is terrible. We have 18 systems on it. We run a Windows NT network and two Nobel networks. We're going to be replacing one of the rooms with 24 systems on a second NT network. That seems to be the state of the art thing that people are really going towards these days. We're currently ranked #1 in the county in Educational Technology. We've beat out everyone else around and we're pleased about it. We have the Educational Technology Training Center. That's a grant that was given to each one of the counties. There was 21 grants issued and one school per county was obviously get the grant. We've run close to 150 teacher training sessions since October 29 in that room. That room consists of 36, 233 Pentium pro systems that are on a windows NT network that have all different types of software plus a lot of CD ROMS that we can put in at a moments notice. If there's elementary instructors that want to see different packages of CD ROMS; we can do that for them. We don't install that kind of thing. There's

no reason to install when we can play it when we need. We haven't run specific programs for administrators but there's been a number of building administrators and superintendent's that have come down and taken courses on their own. I know that (one superintendent) has taken programs with us. There has been other principals from all over the place that have taken them. I haven't even taken them. I haven't taken advantage of it but I've been kind of lucky because I have all this stuff to play with. I got the laptops that have the same type of software on them. Some of the programs that we have run are Power Point, which I happen to be proficient, so I really don't need to take those programs. Some of the word processing programs, there's some programs we have going on in there, you and I might take for granted, some of these teachers and principals don't know the first thing about it. So this really worked out nice. It's a nice facility.

Principal M: (The principal) who I mentioned, is going to be the principal of the new middle school that we're building. He's been in the district, he's been under contract for a year and a half and he has done all of the technology work in the district. In a year and a half they have completely wired the elementary school and the middle school. All of the classrooms have computers that are all networked. We have a server down at (the middle school) so we all have e-mail between the buildings and within the building. Every classroom has Internet access. We have our direct line so it's automatic access to the Internet. Each classroom has a 27" television that is hooked up to cable but is also hooked up to their computers so anything that's on the computer screen the teachers can display on the television screen for the entire class. The other thing that's going to happen this summer is all of our libraries which now of course are all being split up, they're all going to be automated and put on-line so that all three libraries can be accessed by the students in all three buildings and we're also putting in administrative software this summer so that all our student records, report cards for the middle school, etc. will all be on the server, on the network as well, all our health records, etc.

Principal Q: We have a five year plan which we developed which I think this is the third or fourth year of implementation and we have a committee that's made up of board members, administrators, teachers that came up with a five year plan. We're also in the next to the last year of a referendum. I'm sorry, not a referendum, a lease purchase. A lease purchase for a major technology initiative. We got computers in all the classrooms in all the schools except middle school. Because the middle school is an older building, we decided not wire the building at the present time. We're going to be doing it with a bond referendum that's part of an expansion in the district. We not only have computers in all the classrooms, but all the classrooms are wired, got up to speed on software, hired technicians, and what have you. Here at the middle school we have two labs which are networked and wired as well as, the general office areas, and in our library. We have computers on carts which the teachers can sign out and make mini labs in their classrooms even though they are not hooked into the network.

Principal R: I would say we're in pretty good shape considering where we came from. The district in total has about 150 computers. I have a 20 lab station in this building. Every classroom has a computer, we're all networked, we have Internet, e-mail. What we're trying to

establish is more lines for Internets. We only have two lines for the whole district. We're trying to get more access based on whatever money comes through. Fortunately, we have a technology coordinator. He's been the God send of all of this because he also serves as our technician. All this really happened about two or three years ago. We came really from nothing. I was here five years ago when we had typewriters and now we not only have a MAC lab, we have a PC lab and hopefully we'll have another lab in the high school so we'll have two labs in the high school. One for smaller instruction the other one for large class instruction and also night time PC lab. We've gone leaps and bounds with that. We have a five year plan and that basically looked at and adjusted upon funding and how we're approaching old computers verses new computers and how we're funneling them through. We're making a slow turnover to PC's because the Mac's are giving us a lot of problems. We've started at the high school and we're making our way down. The other piece is looking at furnishing. People forget, but they have to sit on something.

Principal W: We have a lab with 25 dells we just got this year, so we have PC and we had a lab of about 25 Macs that were distributed around the district to the classrooms, library some areas. We also have a lab with about 15 computers in the technology area for the general technology, intro to engineering technology, those kind of classes, computer drawing. The landscaping and ag classes have three computers that are used for landcad and designing different landscaping. The library has six computers that are for student use, they have their own set up for the library itself, inventory. All the offices are going to receive new PCS and then all the Macintoshes that we have will be distributed to the classrooms again. The goal is by next year to have at least one computer in every classroom, a TV and VCR in every classroom, to be hooked up to a local Internet, a local net, and also the Internet. We're looking at by next year to be totally done.

Question 2. <u>How would you describe your school's technological mission?</u>

Principals tended to describe their school's technological mission in rather general terms. Principals B, E and M focused primarily on the use of technology to enhance teaching and learning. Principals H, M and Q discussed the importance of providing students with the skills necessary to compete in programs of education and in the job market. Principals M and R emphasized the importance of training teachers in order to realize the goals of technology. Principals R, W and J focused on institutional goals concerned primarily with catching up, keeping up, or becoming a leader in educational technology.

Principal B: One of the things we want to do of course is interface computer technology just as the content standards suggest to do, across content, with computers being used in the

classroom. At this present time, however, our instruction and computer usage is rather segregated between the classroom and the computer lab and teacher applications. Our thrust, our goal is to keep technology current and to use it in curriculum.

Principal E: A number of people on the committee do not want the Internet so that took our central focus with the technology plan. There was a lot of safety issues. Making sure children are safe and then the other discussion was are we doing too much for the students by having them have like a homework line or these other things. So there was a lot of discussion back and forth with that. But basically we want the technology to be used as a tool. We still want our teachers to teach. We want them to use a computer rather than a blackboard, putting TVS and VCRs in every classroom so they can hook the computers up to it and combine a couple scanners with a couple projectors. Students this year are real excited to do that. Keeping our basic curriculum but using it as a tool to bring that curriculum along.

Principal H: I think our objective will be to prepare our students for what they're going to find when they leave, whether that's college or work, and to at least give them the basic skills to be able to meet the change that occurs in technology. There's no way that you're ever going to prepare kids for everything you're going to face when it comes to technology because it changes so quickly. So what we gotta train the students to do is be at least flexible enough to have a basic understanding of technology and how it can be used to make their life easier and then the types of skills that they need to be able to take that interest and that understanding and change as technology changes.

Principal J: Above and beyond every other mission. We're on a mission to be the leader in educational technology, as our letterhead says. We want people to look to us to be the experts in educational technology and I think we've successfully done that so far. At the teacher in-service day, most of the technology activities take place here because we have the most facilities to be able to do those kinds of things. We put that above and beyond everything else. We would like to think that we prioritize the technology. In some school districts, it sort of sits on the back burner, but here it doesn't, simply because our Superintendent is really, really into it. He's a techno nut. It makes a big difference cause I don't have to fight for anything. It's never a question, should we buy a uniform for a sports team. Our priority here is to make sure that our kids can get on the equipment and get on the systems and our staff members can utilize the stuff.

Principal M: Now you're going to test me to see if I've read everything. What we've been working on as far as training with the teachers all year. We've had a teacher from each building that's been involved with Steven's Institute and they've gone to 15 workshops where they're working with the people at Steven's Tech to come back and work with our faculty and integrate the technology into the lessons, into the classroom experience. I have to say that for the very first year the teachers have just done some wonderful things using the technology within the classroom. Basically, it's to get the student's ready for what they're going to deal with out in the workforce. These technological skills are what they have to have to compete today. I think we're well on our way to doing that at this point.

Principal Q: That's a tough one. The school's mission, I think, is to bring the kids into the 21st century with as much advancement as possible, and make them competitive not only here, but also when they get out into the workforce, and into high school, and into college with all the districts.

Principal R: Well, I think we're trying to become pretty much on par, perhaps that's not a great word, but we're trying to maintain what the kids and staff can handle really. At the same time, we want a lot of technology, and unless you train for it, you really can't do anything with it. We're pushing a lot of teachers to take advantage of the ETTC. We also have in-district courses available through our technology coordinator. We can only go so fast because you have to have the background to do it. Our teachers teach computers to the kids, therefore our teachers are the ones who are carrying this, and unless they feel comfortable, we're not going to go too far. A couple of teachers have really run with it and get into hyperstudio in the multi-media presentations and they in turn have inspired others to go into it and they train them. But that is one of the challenges, that we try to keep abreast. We can only go that far.

Principal W: We're on a fast track for it and it's really improved over the last year because we do have a technology specialist that just deals with the computers. His job is just totally getting the district in line. We have a technology plan that's probably 50 or 60 pages that most of the county used as a model for their plans. He's really good and he's on top of everything and getting us pretty much in line and probably ahead of most schools.

Question 3. <u>You've talked about where you "are" and where you would like "to be," how do you plan to move from the current state of affairs toward the realization of these goals?</u>

None of the principals offered a comprehensive or detailed plan that they would use to move their school toward the achievement of their technological mission. Instead, the majority of principals spoke in general terms that included references to items or individuals that exist outside the realm of their control or responsibility: Principals B, E, H and J focused on the need to obtain additional funds and computer equipment; Principal E, H, Q and W referred to the district technology plan to guide integration of technology; and Principals B, E, M and R discussed the need to provide teacher training in order to ensure appropriate utilization of technology resources. Responsibility for the provision of staff development opportunities was considered a function of the technology coordinator (Principal M) and staff members' personal

initiative to take advantage of the ETTC (Educational Technology Training Center) located in the county vocational school (Principals B, H, M and R). Only Principals R and E made specific references to the role of an administrator in the realization of technology goals: Principal R discussed the use of annual evaluations as a means to encourage people to seek out training and utilize the computer lab; Principal E noted the importance of hiring people with computer experience and making technology an "administrative priority."

Principal B: One thing is computer instruction for students, keyboarding at a certain level, curriculum skills that they will need. Where we need to continue to thrust to improve the situation is the teacher instruction, which we are utilizing ETTC in Warren County to help with that, and that does help to a certain degree. But the complete cycle of computer utilization with staff and students is not gonna be fulfilled until we get a dedicated computer on each teacher's desk and hopefully using the computer lab not as a prep, but the teachers will be required to be there as well, so that they are getting computer usage and software usage along with the students.

Principal E: Part of it is, the technology committee is going to continue to meet. We have a plan and we're trying to follow the plan, to keep up-to-date on our plan. By such and such a date, we'll have so many computers in the classroom, and then the VCRs and TVS, so we can have the distance learning. Where we are yearly, we try to see, and every year we focus more and more on getting more computer literate. Even as far as hiring, when we're looking at hiring people, we're looking at... One of the key questions are: Tell me about your experience with technology and can you tell me, have you used a computer in prior experience? I have some that never used a computer and I have other people that have. I will lean towards the person that has that technology background because I want to see that use in the classroom. I see us getting there by doing a lot of training for our teachers, following our plan, up-dating our plan constantly, and making that a priority with the district. The administration must make that a priority. That's how we'll be able to get what we want.

Principal H: Ah, we have a technology plan that was put into place, as most of the schools in the county do. That plan is really being now looked at from a cluster arrangement so that we can enhance the curriculum as a region and the regions are then putting that together on a county-wide basis so that we're doing feeds into what is happening in the county vocation schools which is our technology center for the county. To do that, obviously we need the resources and this year's budget included a sum of an extra $150,000 in a supplemental question, in addition to about $75,000 that was contained in the budget. But we're putting that money in, which is what I would feel to be a fair amount of resources to be applied on top of every media technology base to start with. So that's going to keep us up to date, maybe get us a little bit towards where we need to be.

Principal J: Well just keep moving. Our goal is really to have 5 computers in every academic classroom. Right now I have 2 and 3. After the summer, when I replace the one room where I have a bunch of 486s that have network cards in them, I will surpass that goal of five. So we'll just look at what's next. Is the next thing to become an Internet provider for the entire county? Then is the next thing to become an ITD provider for the entire county? We just keep moving forward. It's not like we ever stop. I use the analogy, as long as the boat keeps moving forward, we don't have any problems, and that's really what we're doing. If our HSPT scores continue to go up the way they are, we'll just keep moving forward with that. If they happen to slip back, then we'll do something different. We're in a constant state of change. Not major changes, but yet we'd like to think that we're just adding and adding and adding, and sooner or later we're going to explode at the seams, but that's a nice problem to have.

Principal M: We're real fortunate in that we have a couple of people who are very technologically skilled already. (Technology Coordinator), who is presently the computer coordinator in the district, the principal, we have two or three teachers in each building. Fortunately, those people are very willing to share. So there has been a tremendous amount of training for the staff and working with the teachers. Like I already said, we've been involved with the Steven's Institute initiative. Many of the teachers have gone to Warren Tech because Warren Tech offers all the courses. So many of our teachers have gone there for training and then we have in the district what are called (District X) credits, where you can take a course in-house and get credit for it. So (Technology Coordinator) has offered courses on the Internet, courses on desktop publishing, just courses on how to use the network for (district) credits and so many of the teachers... We just keep trying to present to them the advances that we're making and how you can use them to enhance the lessons in your classroom and what the applications are for the students.

Principal Q: We have a five year plan which we're going through and following as much as possible, even though it's very difficult. When you develop a five year plan like that, something down the road, by the time you get it published and printed, is already out of date and already behind the times. But at least it gives us some direction of where we're going. We're getting the Internet next year in the buildings with all the ones that are on the network. So it'll be in our labs, our libraries, and what have you. It won't be in all the classrooms like it will be in the other schools.

Principal R: Well, one of the pieces is training, and part of it is encouraging people through your annual evaluations in relations to the training. Making sure they're kept abreast, with us being available. Next week we're going to let them know which ones (training sessions) are available during the summer. There is a small fee but I'm sure the district will absorb that. If not, I'm sure the teachers, for a minimal amount, won't have any problems with that. In fact, if you're going to do keyboarding as a major focus, that's one of the focus that will be required, to bring the class everyday. Create a schedule because the lab currently is not used unless it's a cycle course with our middle school. Therefore, if you bring the kids in there everyday then the kids already know how to behave. It's going to be like everything else. It's going to be more

like a routine. That's what we're trying to establish. Those are the steps we're starting to emphasize, make it more available to them, and making sure it fits in their schedule.

Principal W: Through the plan that we have, there are certain things that are designated for each year. So through budgeting, curriculum, through the planning stage, each thing is designated for a certain year. It's been accepted by the board and by the staff that this is what we're going to do. So step by step we will accomplish those areas and basically that's how we're going to do it.

Question 4. How would you characterize the role of the principal in the introduction, implementation and integration of computers in schools?

Although the importance of providing administrative support for technology was communicated by all principals, their views on the nature and extent of that support seemed to vary among them. While Principals B, E, J, M, Q and R advocated direct involvement with technology, Principals H and W believed that implementation of technology was best accomplished through delegated leadership by teachers or technology coordinators. Of particular interest is the stark contrast between the views of Principal J, who emphasized the role of the principal in leading a computer initiative, and Principal H, who asserted that it was not the job of the principal to get involved in such a time consuming endeavor. Additional responsibilities of the principal included providing access to resources and training opportunities, modeling various applications of technology, trouble-shooting technical problems, addressing the emotional needs and feelings of faculty members, and communicating expectations to staff that they must become progressively more skilled in the use and application of various technologies within their current job function.

Principal B: The principal/CSA, whatever the case may be, really has to make sure that the vision is out there and that the money is available to flush out the vision and setting the expectation goals. The teachers are a little reticent, to get used to something like this because they've always done it without computers so why do I need to use them. They need to be

encouraged and they need to be urged on to see that something like this is going to benefit them. Another part of the role of technology to that, which has to be adhered to the process, is if technology isn't better and more efficient than the current system then it really should be carefully scrutinized whether you want to do a complete change over. Of course, the second problem is to build confidence in staff members, especially when computers break, they do down, the system goes down, or the hard drive gets fried, or their disk data disappears. This type of thing destroys confidence. More instruction has to be given in order to teach them how do the proper backups and how to be careful with the system. That the data is not chipped in stone.

Principal E: I have to be very excited about technology and I have to be a role model although I don't have a computer in my office. I've been asking for one for three years and for three years I've brought a laptop from home and I use that a lot. I think a role model, being involved, taking in-services with the teachers. I go down there at least once. Usually we have three sessions, and I try to go and attend at least one full session with the teachers, and talk to the teachers, and what I've been doing is, the session I've been attending, she has on levels, and it's a level for teachers that are the least likely to use technology. They haven't used it. They're a little afraid of it. So being a role model and working with the consultant... The teacher consultant and I work very closely together. Any kind of technology I need to get or buy I call her in and make a decision together. The other principal in the other building, the two of us will talk with the consultant and say this is exactly what we want. This is what we want for in-services. Right now, over the summer actually, what we're focusing on is all the in-services that are planned for next year. What are we going to give our teachers. Because what we have found even though the vo-tech, and our teachers did go over and take advantage of the vo-tech, we still have some teachers who feel more comfortable in our lab with our teacher. For them, it's safer. We're going to continue with that. We had some training at Centenary College through a grant that came up. They did training on some software for us and that was really successful. But just being very involved. Talking to teachers about it, encouraging them. What we do is use different teachers to help other teachers and that makes that one teacher that's helping the other teacher feel good, and sometimes they feel less threatened. I was working on Excel for a class at Seton Hall, and talking to teachers about that, and how I found it difficult and was struggling with it. Just talking about it, that is important and we need to have it. Yeah, there are some things that, as a teacher, we can very well live without, but there is just so much information, that we need to get to a point where we feel comfortable, and that if there's something we think is important, we can use it.

Principal H: I've only been a principal for 3 months. Um, I think basically they have to be the supporter. They've got to make sure that people are out there, that people who have interest, at least get to see some progress towards getting those needs that would keep this concept of technology. Technology changes all the time. That we work with the people we have on staff who really are the peer directors and leaders in this and see that they have the opportunity to get things done that maybe we don't. I don't believe that it is our position, to take charge for any one particular thing, because what ends up happening is you develop plans, and devote so much time, you're going to be the driving force of this, and it's not going to get done

because there are too many other things that interfere with your day. It's important to have someone in charge of technology and you set the stage for that person, and the direction, to provide the support necessary, and you let them do the job.

Principal J: There's a number of principals that don't believe in computers or don't use them. My feeling is that excellence is demanded from the top and that includes the use of computers. People see me using it everyday. During our in-service day I asked every staff member to send me an e-mail because I want to make sure they can use it. Typically I will run my faculty meetings with PowerPoint presentations. It's not to show off. It's a matter, hey listen, we got these laptops that have PowerPoint on them. You can all take one home with you. We have the $8,000 projector. They're very easy to use. Why can't you integrate them into your classrooms? I guess in a nutshell, if they can't see me using it, why should they buy it? If you don't lead by example, they're not going to bother using the technology. My job is to make sure that I'm a conduit for what has to go on in the high school. Part of that is the computer. I do all my own word processing because I can't waste the time of the secretary who's doing other things. As far as I'm concerned, someone's who's not using it is afraid to use it and being out in the hallway is an excuse.

Principal M: I guess probably supportive. There are still people on staff that are very much intimidated by the technology. There have been people on staff that have felt overwhelmed at times this year because we put in the whole network and all the technology. We put in a new phone system so that every teacher has voice mail and can receive messages from parents and leave messages about homework and what's going on in the classroom on a daily basis. So there were times when people felt very overwhelmed. Trying to work with those people, to let them know that, yes, we understand that it's going to take time. Yes, we will help you learn how to use the equipment. Fortunately, the district that I came from and (principal), we all had this in place there, so I have first hand knowledge on how to use all of that, so I can take them through it. I can help them. Or if not, if I don't have the answers, sending them to a place to get the help, or asking somebody in the district. So if someone is really struggling, you can go and offer some support, show them what they need to do. I think, understanding that some people are going to be intimidated still by the technology and are going to need support as they go through this and learn how to use it, you can reassure them.

Principal Q: Probably one of the things that we take advantage of here is... One of the reasons I was hired, in the district where I formally worked, I was not only the assistant principal but I was also the technology coordinator. So I have quite a background and I think that, by myself being a model for the staff and for the students in technology, I've certainly been very helpful in their building here, because, not only am I supportive of it, but I'm also a user of it, and people see me doing things and whatever. I think that's been very helpful.

Principal R: Probably the expectations. What I expect teachers to do and not to do. I will encourage them to bring their kids in. For example, in our writing, we just finished, we're asking for every student to have so many published pieces by the end of the year. However, in

this school, grades 4-6, they have to be done on the computer, not handwritten. That will not be accepted. So certain requirements have changed, therefore we'll require the kids to do more with the computers. Also, we have computers after school twice a week. We're hoping to extend it to three times a week next year after school. Encourage the kids to stay. Not only play on some games, but eliminate the games and actually use them to complete their assignments or to work or some other sophisticated skills or even keyboarding. By providing opportunities as principal.

Principal W: Since I'm not an expert with computers, I think it's my job to make sure the person who is an expert can get to our staff and make everything available to them, and give them knowledge they need to use the material. That's what I do with our specialist. He does in-servicing, he stays after school, he runs programs in classes after school, he does individual things with the teachers. He'll come to a work session for the staff and do some in-servicing there. It's my job to make him accessible and make the teachers accessible. So it's back and forth, and they can get the knowledge that they need.

Question 5. Imagine yourself at a PTA meeting and parents are asking why it is necessary to provide children in this age group with access to the Internet. What would you say to them?

Common among all principals was a view of the Internet as a unique and valuable tool that has the potential to shape the methods, means and outcomes of teaching and learning. Advantages of Internet-related school experiences included: opportunities for research, communication, and interdisciplinary projects; easy access to a tremendous volume of the most current information; the development of skills and knowledge necessary for meaningful participation in the changing world of work and higher education; and the ability to address different learning styles and enhance the subjective experience of students in the classroom. It is interesting to note that while Principal J seemed to question the efficacy of books in light of the more dynamic, interactive nature of the Internet, Principal B maintained that, "good, hard books in the child's hands always will be valuable."

Principal B: This is a valuable research tool and in fact, is becoming so valuable that it's really become hard to get along without, especially with all the information. Another selling point, as far as I'm concerned, it takes about three years for Science books, for example, to go

from the developmental stage to production. In three years time, we know what's developed and what's happening in Science is totally out of sync and it's not even worth teaching and the Internet, just in the Science and Social Studies area, can be the only way it can possibly work. Another good plus factor is if they don't think this money for textbooks is necessary then I would say, we can have a CD ROM tower for references, and the Internet for current information, and since it's constantly being up-dated it would probably sell itself, even to the point that they'd say then why do we need a library? But good hard books in the child's hands always will be valuable.

Principal E: I think what I would say to parents is that there is just so much information out there. It seems more real to them if they get on the Internet. Working with children on the Internet, I would really emphasize safety. The teachers will be available but a safety issue has to come second to the information that children are able to get. It's exciting for children. It just makes the lessons more alive and the research more fun for the children. Again, being very positive and getting them specifics of what teachers have done in other schools and what research says. If the children aren't working on the Internet, they're going to fall behind. We need to have all that information if they're going to go out and be prepared to go to college, go on to the work world. They need to start now to develop the skills and get that knowledge and be able to make decisions on the way the Internet is now, with its good information or not. Having them start making those decisions right now. Again, I would emphasize the safety and the importance of the information that we have.

Principal H: Probably the best thing to do is, let's organize a program and take you down there and show you what's on it because talking to them about it is not going to make them understand, they really have to see it. They need to see the information that's available and see how readily available it is, and how quickly it's up-dated how that can be integrated into the curriculum. My feeling would be to put on a demonstration and the best way to do that would be to bring kids in.

Principal J: All students learn different ways. It's been my experience so far here that our students would much rather do a research project and do a better job on that research project on the Internet than they would in the library. End of story. It eliminates problems in the library. You're going to have the kids that a) have trouble reading or b) just can't be bothered looking at books because they think it's a bore. The flip side is that we have kids in classrooms doing these research projects on the Internet that are interested, that are excited, and are enthusiastic about doing them. It's that simple. Not everybody learns the same way. Some people might want to look at books and that's great but I found that these kids much prefer getting on the Internet, doing their research, and they do a much better job. We never have had a problem so far with our kids being in the ETTC or up in the ITV or any of our mass computer areas. We've never had a problem with discipline when they're on the Internet.

Principal M: That's happened this year. All of this is new to many of the parents and those questions have come up. Why is it necessary to spend all of this money to do this? Again,

going back to the Core Curriculum Content Standards and the workplace readiness standards, those skills are necessary to be able to compete. When students are going to high school and college, those skills they have to have in place, and then coming out of high school, of course, being able to go into the world of work. Even if you go to the trade school, computers are used for so many of the things that were never used before. Do I think it's absolutely necessary for K-2 to be on the Internet? Only, if extremely guided, and that's something the parents need to be reassured of as well. We do have a baby-sitter on our network. Of course, that cannot filter out everything. There have just been some wonderful opportunities that I've seen in the school with penpals, with classes working with another class half way across the country, to do projects, and the two classes working together and coming up with their finished project. The one third grade was involved in an Internet egg hunt at Easter time and happened to win it nationally and they gave them all the prizes and everything. The children become extremely excited about the work, about the project. Let's face it, you're doing research, to pull up Encarta, and be able to click, and hear the person talk, and see pictures, and then have other areas identified where you can go for more information... It's certainly a lot more fascinating then opening up an encyclopedia.

Principal Q: I would turn that around. I think people in this district would be more likely to ask, why aren't we providing access to the Internet? We know we haven't been able to because of budgetary constraints. Now that we have the distance learning money that's being made available, we're going to be getting Internet to our district through that. We do a lot of research. We do a lot of inter-disciplinary units here, and in fact we're emerging as a middle school, and the coordination of those things that we have right now are almost to the point where we have to go further. The Internet will give us that opportunity, to go further through research by the kids, which the kids are doing now through CD ROMs and some other things and through the network software that we have. The next logical step is to go out to the world wide web.

Principal R: The benefits of the Internet... Primarily, the way we look at, it is one skill or one piece of research where they have to be able to realize that we are an information age and unless they are taught correctly, first, then they may be taught by their friends. It's like anything else. You pick up bad habits. You hope to teach them correctly the first time, and so they'll have their choices, when everyone uses bad habits or not, but at least they can never say they were never taught correctly the first time.

Principal W: It opens up the whole world. What I'm trying to do is tell them that this is a tool. It's like using a hammer, if you're a carpenter, and it's like using a pen, if you're a writer, and whatever field you're in, this is a tool for them. They have to have the knowledge of how to use it. If we let our kids get behind, they're going to be behind in the world because the world's using technology.

Question 6. In addition to the educational benefits made available through the Internet, there is also the potential for problems. What safety, liability or educational concerns need to be

addressed before schools are ready to tap into the Internet?

Seven of the eight principals specifically mentioned the use of a district policy and/or contract that outlines acceptable use of the Internet and the consequences for the violation thereof as a means to address the problems associated with providing access to the Internet through schools. Additional proactive approaches used to prevent problems with the Internet included: the physical arrangement of computers in the lab; keeping parents informed through written communications, meetings and training sessions; and clearly communicated teacher expectations for appropriate supervision.

There was some disagreement among principals regarding the ability to completely censor certain objectionable areas of the Internet. Some believed that effective safeguards existed, while others believed that the nature of the Internet and the advanced skills of students precluded the effectiveness of such an approach. Although several principals spoke of the existence of firewalls, baby-sitters, and surf screening systems which helped block access to objectionable sites, the majority addressed the need to teach children how to make sound and responsible decisions when using the Internet. Specific concerns centered around access to chat rooms, unacceptable websites, and inappropriate material. Individuals cited as responsible for ensuring appropriate utilization of the Internet included parents, students and teachers. None of the administrators mentioned themselves as responsible for appropriate Internet use.

Principal B: I don't think it takes anyone who's been on the Internet more than 30 minutes to realize that there's potential dangers as well great benefits. Sometimes your problems can come from very unexpected areas. For example, we had a substitute in a computer lab one day, and innocently a child brought up something about the White house, and instead of .ed he put .com and it was an unacceptable website. It was a perfectly honest mistake that could be very easily done and no matter what surf screening systems that you've used, nothing is absolutely perfect and again it boils down to close teacher supervision. Another, and this seems

a minor point but actually it isn't, the layout of the computer lab and the actual positioning of the screens of the monitors have to be considered when you set up a classroom. In our computer lab all the screens are placed to a specific side so at a glance any teacher can see exactly what's happening on all the screen's. They're actually facing the walls. That allows the students to focus on what they're doing and the teacher to oversee every student at all times, verses rows where a child in a particular row can be doing something. Given the opportunity, they will certainly try, so diligence and scrutiny have to constantly be used. There is no guarantees.

Principal E: That's something that we've been talking about all along. In fact, when we just had our last technology meeting in June we came up with a contract. Students would sign a contract about use. Parents would also sign a contract about the students' use, and based on that, we're hoping to encourage safety from the parents and from the students, that this is what will happen if you decide to do something that we don't want done here. We've also worked with the vo-tech. We've had vendors come in and show us some of the, I think they're called firewalls, how we can block out certain things for students. That's probably what's kept us back. That's why we're still not on the Internet, because we've had really verbal people on the committee that said, how are we going to bring them along to the point where it's safe? Having students take responsibility, and also the parents take responsibility, and in the contracts we're also asking parents to make sure the children are safe at home also. The other thing we're doing is we're having parent meetings. We're asking parents to come in and talk about this and we're going to have some training in the lab for parents. We're going to send out surveys and we're going to see what parents want. The people who seem to be the most against it are, the younger people who grew up and that was their major in college and it's almost like they know too much and are afraid. In fact, some of them wanted us to have an acceptable use policy and have our teachers sign contracts which I really didn't want as principal because I felt that we hire a teacher, it's implied that morally and ethically you perform a certain way. To have them sign another contract I don't think is something that is really needed. We finally decided that we wouldn't have the teachers sign the contract because it's a professional obligation. They know what they should do and shouldn't do on the Internet, and they obviously could lose their job if someone spent too much time on it or whatever. Now, we don't have an option to opt out of the Internet. If it's going to impact on our curriculum and it's going to be a part of our curriculum, I really don't see how we can have them opt out. I can't have parents picking and choosing what their children are going to do. I just can't do it. So I've put it to a point where the Internet is gonna be a part of the curriculum. Right now we're going ahead with it not being an option to opt out. If we have parents that say no, we're going to try to bring them in and discuss it and make them feel better that their child will only be on the Internet when the teacher's right there with them.

Principal H: Obviously the concerns are chat rooms which are things they don't need to get into. It's so easy for kids to move into those areas even though you try to put on blocks of protection. Obviously you do need to be putting the blocks where you have problems. We have policies which direct our staff on appropriate use of the Internet. We put notices out to our parents informing them of the policy, asking them to cooperate with us, and we gotta watch. We

gotta have people with the kids so they don't have free, wide open range, because it's human nature. They're curious and they're going to go there. I can't request to try to keep them from going there. I don't know that you're ever going to succeed one hundred percent but I think you need to take every effort you can so that in the event it does happen, at least you can demonstrate that you have take all the appropriate steps.

Principal J: One of the problems is that they say they have the firewalls in some of the software. Most of those firewalls are extremely expensive. You could spend thirty to forty thousand dollars on firewall software. We have an Internet user policy that our students and parents have to sign. It gets sent home in August, that all schools send home in August. It's expected that any of the materials that our students will pull up on the Internet will be PG. We use sort of the same type of movie rating sheet. If we catch someone pulling something up, and it's happened once in the three years that I've been here, we pull the kid off and he doesn't have access anymore. All of our kids have passwords, so if we pull the password away, they don't have access to any of the systems in our building. Does it bring up problems? It brings up problems if you have staff members that aren't monitoring. Let's face it, if you get a staff member who's going to sit at their desk while you have twenty kids on the Internet, you're going to have a problem or a potential problem. Do we allow kids in chat rooms or any of those things? No, we don't even have American On-line. Kids can get there if they really know how but the bottom line is that we block all those things out. We have not had a problem. Once in a while you might find something in print that might be inappropriate but when we see it we address it. The benefits far out way the negative side of it. A couple months ago, some of the local radio shows, even the Congress, was trying to get involved on how they could police the Internet. Don't police the Internet, leave it alone, because the benefits far outweigh the negative side especially in a school like this. That's the way I feel.

Principal M: We have a district policy that was written by (principal) and (technology coordinator). In the policy it says that the students will use the equipment properly, that they will not use it unless under proper supervision. There are consequences listed in the policy, that if you do misuse the machinery and cause a problem, like a virus or something like that, or destroy it or improperly use it so that you end up looking at things, then you'll lose privileges. The students and parents have to sign that. That's district wide. Like I said, we do have a baby-sitter on the network to only allow access to certain things. There has been teacher meetings where (principal) and (technology coordinator) have instructed all staff that children are not to use the Internet unless under direct supervision. You can't just say to a child, well go look this up. It has to be direct supervision at all time. There is no surfing.

Principal Q: Even though technically we're not on the Internet yet, we have one connection right now through a phone line hook up in each of our libraries in each of the buildings. What we do have though, even though we only have Internet for that, is we already have a use policy for both the Internet and our technology system which we sign off by the students and by the parents. It is something that when the students move to the next school they have to sign a new form then that covers them through 5th, 6th, 7th and 8th. When they get to

the high school they have to again sign off on an acceptable use policy that we have. We also have the controls that keeps kids out of certain areas that they shouldn't been in and what have you. We strictly enforce the misuse of anything in the building which includes computers, technology, the Internet, and what have you. We think we're ready for it. We don't know if we've addressed all the problems but we're trying to be proactive and address them before it comes up.

Principal R: We have come up with a contract for the kids to read and to sign. The fact that they've done anything illegal, or anything that is promiscuous, or any of that, they will suffer the consequences. By reading that, and knowing what's going to happen, we've taken it very serious, and they need to see that also, and the parents have to sign it with them. If they don't sign it, then they're not allowed on. That's their ticket to get on. If they're in violation of that, then they will suffer the consequences like any other discipline.

Principal W: We developed a policy on using the computer for the students, sent them home to the parents so that they know what the policy is, and unnecessary use of the computers, let's put it that way, or illegal use of the computers, or any of those kinds of things, they take the consequences just like they would for anything else. It's like skipping out of school. You do it, you have to pay the consequences. If you're looking up things on the computer, off the Internet, that you shouldn't be looking at, if you're accessing little chat rooms and all the sexually explicit stuff, then you're going to be in trouble if you're caught. We do have some safe safeguards on the machines, through programs and software, but the kids are more advanced than most of the staff and can get around all those things. You know high school kids are going to test you to see how far they can go. We deal with it as it comes up, but we do let the parents know it can be a problem. They should keep an eye on their kids through the newsletter and those kinds of things. We keep them informed.

Question 7. Few schools are able to avoid the issue of limited resources as a factor effecting the use of computers in general and the Internet in particular. What kinds of expenditures on technology would you like to see for this district as a whole and for this school in particular?

Principals' responses fell clearly into one of two categories: those that reported being completely satisfied with the level of funding and amount of computer technology currently in place in the district; and those who defined the issue of resources as a major problem facing the district. Common among the latter was a history of significant budgetary problems which had

caused the district to fall behind and precluded its ability to catch up. Principals E, H and Q, all of which described their district as technologically deficient, discussed the need to obtain and/or upgrade hardware, software, network connections and operating platforms. Principals B, J, M, R and W spoke primarily of the need to continue to follow their district technology plan and upgrade their computers in order to keep up with advances in technology. Although each principal touched on one or more of the various expenditures necessary to support a successful technology program, none identified all or even a majority of these resources.

Principal B: I was very fortunate to inherit quite a good legacy of computer technology because the CSA has pushed and pushed and pushed for this and spent tremendous amount of time. One of the advantages is that we took line item areas where it would be for textbooks and put it into technology, but there's still all that hardware that had to be purchased and it has to be done as soon as possible. Put a certain line item amount into the budget for computers every single year. Just keep constantly up-grading computers until it's really to the point where you'd like to have it. We also developed a technology plan and we do have the community support for doing this. In addition, having the support from Warren Tech, and being able to get an ISDN line through them has made it affordable and so there's definitely a line item for it. You have to have a service contract. You have to have somebody on staff or ancillary to the school who is constantly on call. The larger your system the more time that person needs.

Principal E: Right now, that's a priority problem as a district. Technology, whether it be hardware, software, or any service, we're putting any extra resources that we have towards that. When we're doing grants, we got a number of grants that have given us quite a bit of money to focus on technology. I do the IDEA flow through for Special Ed and I put a large amount of money aside for technology. Now it has to be used for Special Ed students, but I can put those in the two classrooms where there is in-class support. The resource center has a whole lot to do with that, so I'm buying hardware and software through my monies that way. Yeah, we are limited. We're trying to make choices. Our priority has been, start with the older grades, giving the 6th, 5th, and 4th. They're all on IBMs. Then we started with our other school, 1st, 2nd, and 3rd. Third are getting new computers. However, it's interesting because our superintendent would like us to put those in the lab and send the ones in the lab, which are very good, to the third grade, because the in lab, we're going to need computers that can do more. The priority is to keep the lab now. Which three years ago, we were disbanding it. Which is interesting how it's evolved, because the in-service is so important.

Principal H: Our plan is, I think about eight hundred thousand dollars. So over a five year period, we're looking at about two hundred thousand a year, roughly. I think we need to

infuse more money now because we're so far behind. I could look at a quarter of a million dollars for maybe four years and then that could probably be back down to the $150,000 year range. It's always going to be those on-going needs, upgrade equipment that gets antiquated, obviously the change of technology software, changes with the network, that's going to be an on-going project for the future.

Principal J: No more than we have. For some of these other schools that say they don't have the money, no, you're not making it a priority. I'm not buying that you don't have the money. Your board is not making it a priority. As far as I'm concerned, our expenditures are wonderful in this area. If I say to (Superintendent), hey listen we need network cards for fifteen systems, OK, I'll find the money somewhere. We might have to do without something else, maybe I'll have to do without a piece of maintenance equipment, but that's OK because we gear everything towards the students and staff. It costs us, for Internet access a year in line charges and access, eighteen thousand dollars. That's a lot of money. I write it into the Carl Perkins grant. But that's eighteen thousand dollars that my staff can't have for any equipment. But the trade off is well worth it. As far as systems, we'll drop, in total, between the Carl Perkins and local funding this year, close to one hundred thousand dollars.

Principal M: I don't know that there's much more that we can spend money on. (Principal), again, has worked with the Business Administrator to really work out a fantastic program where the money that the state was allotting per year for technology, banking on that the district went to the bank, borrowed the total sum of money and now we pay it back with that money over the next five years or whatever. The two elementary schools are finished. I have a computer lab that I can use for keyboarding, etc. The middle school will have everything. They have a media center that's going to have computer stations that are going to allow for all kinds of unit study and project study. The media center is gorgeous. The whole building is gorgeous. The only thing that I see the district still having to spend money on, I know we have a big grant that we've just written that's going to go to a media retrieval system, where along with our server down at the middle school there will be a CD tower, there will be laser disc players so that teachers will not have to have VCRs and things in the classroom anymore. You'll just be able to send your CD down or call down and say put this laser disc in. Click on your television and it's there. The media retrieval is about the only thing we need to have in place yet. I think eventually, if (Principal) stays long enough, I think he'll look into an interactive classroom at the middle school as well like they have at (the county vocational school) so that they can bring in courses from the high school or other locations especially in language courses.

Principal Q: We've been in a very difficult situation this year with budget. Our budget was defeated. We had a 25 cent increase just to maintain and that was with a cut. We have students that are moving back to (a Warren County regional) School District because they're opening up a new middle school so we've been in dire straights as far as budgetary issues are concerned. We know that we have to move forward. How we're going to get there, we're still trying to work that out. We're trying to make the best use of what we currently have. We do know that we're going to have to move and up-grade because some of the software for the

systems that we have and the platforms that we're using are just not available anymore and are not going to be available shortly in the future. How we're going to do that? I specifically can't answer that at this time. I would like to see, a way that teachers can use the computers and technology to actually teach from it. Whether it's some sort of projection system or through a flatbed projector, a large screen TV, or whatever, where the teacher can actually develop lessons right on the computers and project them so the students can see them and then the students can actually use the computers at their work stations and in the classrooms. Ideally, that would be the situation.

Principal R: Well, I can't really complain. I think technology, there has to be balance. Some districts have gone totally full force in technology with little regards to novels that need to be ordered or other things. I think that's like throwing the baby out with the bath water. You need a balance. I think, fortunately, because we have a technology coordinator, that's his emphasis. He still is realistic, in terms of having that balance, and I think the district is too. We try to use modulars in the classrooms that has a capability of a VCR/computer for whole classroom situations, not loosing sight of other things that we need. Right now a lot of it has to do with the hardware and major expenditures. But again, I'm not pushing it too fast, because I know if you push too fast, and the teachers are not caught up with it, and it's overstepping their comfort level, and then they won't use it. Like anything else. You're better off going slow and steady because they don't want to spend the money wasting money. You may look good but nothing happens.

Principal W: That's a tough one. I think that would go along with whatever your plan is. If you're spending x amount of dollars on a technology specialist and they're doing your training, troubleshooting, we saved 15 or 20 thousand dollars because this guy's repairing machines, where we had to call somebody in to do that. We had to call people in to do consultant work, to teach classes. We don't have to do that anymore. That's the most important person in your district for technology use. If they're doing the job, they really save you a lot of money and move you ahead. We're just trying to up-grade, and we continue to up-grade and move ahead a little bit, and try to jump ahead a little bit each time. We did put about $300,000 into computers at one shot. That was about four years ago. We're just cycling things through and moving things down. Some of the more technical areas, they need bigger more expensive machines. There's a fifteen thousand dollar program, with a site license and everything. So autocad in the 14th edition, or whatever version of it is around, is $12,000 or something like that. Then you need a plotting machine, you need a plotter printer, and you need all those kinds of things that can do blue prints. We're going to have some part-time technician kind of people. Once you get more machines then you need somebody to repair them. This guy - you're not going to pay him 40 or 50 thousand dollars to repair machines when you can get a technician in to do that for a lot less money. In fact we're hiring kids next year to repair machines.

Question 8. Take a moment to imagine what schools will be like ten years from now.

Describe what we might see, hear or experience in such a school?

All of the principals predicted change in the educational environment in the coming decade. The nature of that change and the clarity of the vision varied considerably among principals. Principals B, E, H, J, M and W described changes in the use of the computer to facilitate teaching and learning, alter and improve learning outcomes, and expand the learning environment to include various sectors of the global community. Principal H also discussed the use of the computer to improve administrative efficiency, thereby reducing the number of people required to fulfill administrative functions and predicted "libraries that were primarily computers and not many books on the shelf." Principal R predicted smaller and more portable computer-related equipment. Principals M and W were the only administrators to express concern about the potential negative impact of increased computer usage at home and at school.

Principal B: First of all, I think we're probably be having laptops for most students if not all. Secondly, I see special assistance technology for special needs children. Right now there's a terrible gap in the system technology. I don't think that manufactures have tapped into that resource at all. Keyboards are too small, they're too restrictive, however, there are some special needs devices already built into the operating system software, for example, the repeat key, when you hit press it down, it'll keep typing like an electric typewriter. You can take that option off if your child has less dexterity. There's speech to text type of things. What I'd also like to see is, the software for children who have creative ideas but have a terrible time getting it down in writing but can speak at a computer and do well. I'd like to see more textbooks put right into a scanner so that the textbook can be enlarged for children with sight difficulties or it could be turned into speech so it could be read. I think I'm going to see, Internet infused into the curriculum to the point where we would probably be phasing out most of our textbooks, and we don't even need to have workbooks per say because children can have things right on the screen and can fill it in with the keyboard or they could even it write it in with a stylus and they can transfer it electronically onto the screen. I would also like to see through the local area networks, the children could access the computer with the keydrive on their computer, so that they could go home and work on their report and not have to come into school with a disk for a report already here, so there's no harm in bugging with viruses or that type of thing.

Principal E: I think in ten years teachers are still going to be very, very important. I don't see, because we have technology, that teachers aren't going to be the person providing the information. I think, though, we'll probably see a lot more cooperative learning, where the students are learning together, and they'll be directed to a point where the students will break

into groups. But I see using, again, being a global world and bringing all that information from the world, the teacher being the person to decide. There's going to be so much information, they can focus it in, and what the children need to know, to make it important for them, and the district. Learning things about other countries. I really hope all of our teachers are bilingual in ten years. Maybe we won't have the blackboards anymore, the paper and pencil. What we'll have is, everyone will have their computer, and the teachers will be hooked up and teaching lessons from the TVs, or pulling the students' work up, and those kinds of things, and doing away with all the paper.

Principal H: I would see new textbooks, computers on every desk, teachers with a computer on a desk, readily available for the kids, as well as the Internet and all the resources. I would see that same computer accessing for the grades, attendance, their own data bases for their lesson plans, individual attendance. I would see them having, through the computer and television access, interactive networks with other classrooms within the school and outside of the school. I would see a collection of CD ROMs available in sections of the building where teachers could access. Libraries that were primarily computers and not many books on the shelf or technology in central offices. You probably would see less people, particularly in an area of administration, cafeteria. I don't think you're going to see fewer people when it comes to teaching staff. I think you're going to see support people who will have the technological expertise as opposed to the educational background. I would see students learning probably faster and I hope we would see a higher interest level. I hope we would see that all this expenditure, time and effort would produce better results in terms of the outlook we have.

Principal J: I think you're still going to see the traditional. You're still going to have teachers that are going to do a certain segment of lecturing. I don't think it's going to be much different than what we're doing now except there might be some more individualized instruction on the computers. I think you're going to see a lot more interactive television bringing outside influences into the school directly live via interactive television. In this area you're going to have a lot of schools going to block scheduling. You're going to see a different type of delivery system from the staff members. You might see some students that are in class for an hour and a half. That's going to make teachers have to change. There going to do, let's say, a twenty minute mod lecturing, a twenty minute mod individual instruction, maybe a twenty minute mod with students on the computer, and then perhaps some review. Teachers are going to have to shift the way they think, the way they lecture, and the way they conduct business in the classroom. Tremendous amount of Internet access. For us it's not going to change that much, except we're just going to keep up-grading the speed as to which we bring this information to the school. Certain schools are going to see a bigger impact because some of the other schools in this county are not very far along at all. They're in the dark ages. They have leadership that says, I'm proud that I don't use a computer. That's going to change in ten years. People such as yourself and myself, we're going to continue to move, and we're going to bring this stuff with us, and we're not going to forget about it, because that's going to be our selling point. When you go out to get a position as a CSA or principal, whatever you aspire to, that's going to be your selling point. If you go in there just talking about curriculum, they're not going to want you.

They want you for your basic knowledge based on technology, because that's the way all schools are going. So as we begin to take over and knock out some of the older individuals that have not made a change or the adjustment towards technology, then you're going to see some changes.

Principal M: A great deal of our work is going to independent work, projects on the computer, or a group working at a project based on computer centers. I see education changing, unlike when we went to school, having to teaching facts, memorization, giving tests that require regurgitation. You don't need that because you can access any fact that you want immediately. It's going to have to be how to access the type of information you want. How to discriminate between information that's reliable and not reliable. To be able to analyze it, synthesize it, and evaluate it and come up with your final project or the information you need. So I think instruction is going to have to move more in that area. Which for traditional teachers, that's a very hard change to make. To release that teacher oriented philosophy where we've all been on stage in front of the classroom and to now allow the students to problem solve. We just did a (district) credit course for our teachers on constructivist theory. Moving in that type of direction. I see the need for, and especially because of technology at home and here, for more socialization and helping students learn to cooperate and work as groups because the Walkman and the video games, so much of that has gone in isolation.

Principal Q: I don't know if it's going to come in 10 years because of money. Certainly technology is going to be here. A workstation at every student desk, it may not be a desk at that time, where the students would have access to the world wide web, which I see expanding hundreds or thousands fold of what it is now, so that any bit of knowledge that a student needs, they would have instant access to it. The speed of transmission is going to be there for them to allow them to do that. Whatever their minds want to do, I think they would have the access and ability to do that.

Principal R: I would think that some schools already have a computer on every classroom desk. Whether or not we would have that, or maybe some form of laptop, I think that's conceivable, and not so much big bulky things, but something that the children can use at their desk and at their tabletops that is portable, that is, they can have flexible use of it, and hopefully, reduce a lot of paper, though I don't think we'll ever go away from it completely.

Principal W: I think you're going to go more to the technological types of things. You'll see the multimedia approach to their class. You'll see them go from something off of the CD stack in the main area and put it up on the TV for Social Studies, and go to part of the computer for something else, and VCR, and have everything planned out so that when they need it, it's right at their fingertips and they can use that whole network of media that's out there to explain their point. Social Studies and Science seem to be the two areas where people are using the most right now because there's so much material. If they want to show the battle of Gettysburg, they can take that off the CD from the CD stack and show the battle of Gettysburg while they're talking about it and show the kids. In science, if their talking about part of the anatomy, they can show that part of the anatomy and not have to cut things up anymore like we did when we're

in high school. That eliminates a lot of problems. A kid can do dissection on TV now on the computer and they don't ever have to touch the thing. It saves you money because you don't have to buy all those frogs. You have a couple for those kids who really want to get their hands on that kind of thing, but the kids that are opposed to that, don't have to do it. That's where I see us moving, to using the information that is in the classroom more readily.

Question 9. Tell me about your own computing experience.

Principals varied greatly in the nature and extent of their computer backgrounds: from Principal H, who admitted that he does not use a computer, to Principal Q, who has taught graduate level courses on the use of microcomputers in education. Common among the more proficient principals, was a serendipitous introduction to the world of technology: the primary impetus for their initial involvement was the result of chance or circumstances related to a previous position. As such, only one of the principals had ever received formal university training in the use and application of computer technology. Several principals had attended computer-related workshops or inservices offered by their district. The majority of principals, however, described informal means by which they had acquired computer skills. All of the administrators except Principal H owned and used a computer at home that was connected to the Internet.

Principal B: I walked into one school district as a supervisor and they said here's your secretary on the desk there and here's the manual. Good Luck! It was a Macintosh. That's all I really had and I had to teach myself basically. From there we got an IBM PC at home and my son, who fortunately at his high school, has a BBS and eventually he got their website on the Internet and he became quite good at working with the computer and has showed me some. So I'm basically self taught, a few courses. Taught myself Excel and those types of things. So, I really came in the back door and started with windows and apples. I'm really not a dos person at all.

Principal E: When the Apple IIe were brand new. We bought one at home. We went with the Apple IIe because it was the high tech one then. We bought it for a couple of reasons. I was going to school, for the children, so I used it mainly in the beginning for word processing, scoring tests. As a consultant, I scored tests on that, the games. I thought I was going to sit down and read the manual all the way through. That didn't work. What I found when I first got on it, I was a lot more nervous than when my children got on it. I was afraid I was going to push

a button and break something. We have a net computer at home and it's very sophisticated. I've been doing all my papers on electronic search. I haven't been to the library yet. It's probably embarrassing to say, but I see that as someday not having any libraries. Maybe the library of Congress, and that's it, and the rest of us will get on the computer. For the last class, I did it on finance. The book came with disks you had with every chapter, you had to do spreadsheets on Excel. I have no experience with spreadsheets at all and I was kind of annoyed that we just had to do it. What I did was, I signed up for a class. I saw that there was a class at vo-tech on Excel so I went over there. I find that I do it more because I have to do it. But I like using it. It's not like I don't like using it. I like getting on to find information. I'm not going on to the chat rooms. I haven't done much of that. I don't know, I just don't have the interest. Right now I wish I knew more and I know I need to know more. But I'm not afraid to go and use it and pick up classes, or to talk to someone, or I bought books like Excel For Dummies. I go to our technology person here when I had that. But I would like to continue to up-date my skills and understand more about the workings of technology when they're talking about t-lines and networking, because I've gone to some of those heavy duty workshops with the superintendent and with the coordinator and I find the more I do that, and the more I read, I understand it better. My husband works at Lucent so he's able to keep me up on it. But I'd like to know more nuts and bolts about it, so I can speak more on a level that I'm more clearly understanding when we're talking, whether it's t-lines or whatever, and how much they cost and why we need it. That's why I volunteered for the technology committee. This forces me to stay up on this. I look sometimes in the paper, what some of the job applications for principals are, most have background in technology. I would have to say right now that would be a weakness for me.

Principal H: I can use an etch a sketch. Truthfully, I don't use one. Not that I don't appreciate it, but I'm an old man who's come from an old school. I have the people here that know how to use them and when I need something I ask for it and I get it. My belief is that we have a lot of people who are being payed too much money, sitting in front of computers that can be done by people that are at a much lower salary. If you're going to pay me fifty dollars an hour, I should not be sitting here typing letters. Yet if you walk around offices today, you'll see a lot of that going on. If I need information about test scores, I can get that from my guidance secretaries. Do I need to have that brought up on the screen right in front of me or could I get it from someone else. So maybe it's the in thing to do for a principal to sit there in front of a computer and use it all day long. My belief is that people out of the office have those skills and we need to use the people we have to do some of those functions. My son is a web master. He has his own business and that's what he does. I don't do anything on the computer. I take my tape recorder and while I'm driving in my car I tape record all my letters. My secretary types all them. I don't spend any time typing. You gotta learn to use your time effectively. I always look for a way to maximize the day. It just urks me to see a fifty dollar an hour person doing what a fifteen dollar an hour person can do and then being proud of it. That is what really bugs me.

Principal J: I learn by fire. I worked for the NJ Department of Education for 2 years. We had no computers. We had one Macintosh that we did everything on. Then when I went to (Sussex County) High School as an Assistant Principal. I had an Apple IIe that I did all my

database work on which was a total joke. Basically when I came here I had a lot of knowledge to begin with, not that I've done a lot of work on the systems but I'm not afraid of them. So it's just a matter of jumping in and that's exactly what happened. When I came here the ITV room was brand new. The ITV technology room was brand new. The Internet was brand new to the school. The Superintendent basically said to me, here's this new toy and you have to play with it. That's really what happened. I'm taking the Quicken program and run all my student activities on Quicken. We have See You, See Me software which we utilize for desktop conferencing. The laptops, I 've loaded all the software on the laptops. I'm pretty comfortable with just about anything. I didn't go to college for it. It's just a matter of not being afraid. That's really what the bottom line is. Some people get offended by these computers. It's a tool. It's nothing more than that. It's not going to take my job. It can't run the building. It can't make decisions based on what should happen here today. It's a tool. But if you're aspiring to a job, and it's based on the fact that you better know something about computers and how to integrate them in the school, you better do something. It's either jump off the plank into the water where the sharks are or figure out what you have to do to get back on the boat.

Principal M: I told you, as an administrator, to me, it's an invaluable tool at this point. Prior to starting as principal here this year, I was vice-principal at (other Warren County school district), Elementary School for a year. Prior to that I was a 6,7, and 8th grade teacher for ten years. During that ten years, that's when all of the technology came into (former school district). The Social Studies teacher and I were teaching together Language Arts and Social Studies through thematic units and we did a great deal with AT & T network and projects where five schools from around the world were grouped together and you would be given a question to answer and you'd have to go out and survey and then send the information back. (Principal) was the CSA at (other Warren county district) before he came here. So I worked under him as a teacher, and again, he was very technologically literate and he would just constantly, when things would come across his desk, would just pass them onto the teachers. You just read. It's there and you just figure out how to use it and I mean you make a lot of mistakes along the way but, and again, teaching 7th and 8th graders, many of them had the skills that at that point, I didn't have. All my training is very informal. I learned a lot from my husband because he was the technology person for (Hunterdon County school district). Most of what I know as far as desktop publishing and using all that comes from my husband.

Principal Q: Like I mentioned, in my former district, I was the technology coordinator as well as the assistant principal. I took care of four schools. I also have taught on the graduate level micro computer courses to other educators. I do have quite a background. I'm familiar with many of the systems that are used for administrative and scheduling and student records and demographics and those types of things and whatever. For the most part I'm self taught. I am taking some computer courses but I go to workshops and seminars and national conventions and conferences. Which I've tried to keep up-to-date with, even though, in my present position as principal, I'm not able to keep up-to-date as I'd like. Actually, I was one of the first teachers in the state to actually get a grant for a computer in the classroom. But what happened was, in the school where I formally worked, we had some money that students had raised through some

fund raising and one of the teachers suggested that we buy a minicomputer. At that time it was an Apple IIe. They suggested that we spend this money. It was a big thing because we brought it up at faculty meetings to discuss it because we were going to spend a couple thousand dollars on this thing. I was certainly against it and said no, we shouldn't do that. We should buy a terminal where we can hook into something mainframe or whatever, because PCS were really just in at that time. What happened, the administration decided to set up a committee to see what would happen. Of course I was against it, so I was put on the committee. I did some research, visiting some other schools. I had some experience in college working on terminals with mainframes and things like that, and that's what I thought we should do. I was kind of turned around that way and I became one of the teachers that was in the forefront of technology in the school at the time and was sent out to seminars and workshops and all that stuff. I kind of got through the back door because I was opposed to it from the beginning.

Principal R: I would say I know a little bit about it. I'm not computer proficient. I spear headed this technology users group. I spearheaded the fact that we have our technology coordinator. When I was in that role I was probably more informed because that was my responsibility, but now that we have our technology coordinator, I sit back and he's focused on that so we can focus on other areas. I've kind of taken a step backwards in that I know a little bit about it from what I hear. I try to find out about it. I try to go back, from the very first course we ever offered here, I took it for the week with the teachers, and I said, we all need to learn together, and we did. Most administrators are really into it more so than I. I don't have the time. First of all, I'm married with five kids. I'm not a proficient keyboarder. I write faster than I would type. By the time I would do it, I would've written it already. I don't have that luxury. But as far as the willingness, it's there. It's just like with everybody else, you don't have the time. I'm probably the last person here to ever get one because I just felt I didn't need it right now because I knew I wasn't gonna use it. I'm not even really using it still. I'm hoping I can learn it when things die down a little bit and I can take some courses that I can feel more comfortable with it. I have one at home. We have the Internet at home and I'm not afraid of it. Eventually I'll figure it out. But it's just a matter of time and I've overcome that anxiety.

Principal W: I have a Mac here at school, a PC at home, my kids know more about it than I do. I use the Internet quite a bit, I do word processing, spreadsheets, we have a database for the kids. I know enough to get around it. I wish I had more time to play with it. I just don't have the time. You really need to be in it and using it to learn things. My secretary tells me how to do things. I just learn as I go. Mostly experimenting, people telling me what they're doing, a couple of workshops. Mainly just doing on my own. Actually, my kids tell me more how to do things than anybody.

Question 10. <u>What steps will you take to establish and update your knowledge of the most current uses of technology in education?</u>

All of the principals discussed the need for ongoing training and hands-on experience in

order to acquire and advance their computer skills. With the exception of Principal H, principals reported that they planned to update their knowledge and skills of technology though one or more of the following means: staff development opportunities made available through their district; out-of-district computer workshops; courses offered by the ETTC or universities with which they are affiliated; trade magazines, journals and professional association publications; and informal instruction offered by more computer literate individuals they know in their personal or professional lives. The relationship between time and computer utilization was highlighted by the majority of principals. What varied, was whether time was identified as a barrier to, or a benefit of, technology.

Principal B: Well I certainly will avail myself of any courses that the ETTC has to offer. I wouldn't mind getting more training, as a matter of fact, I just got an offer to get free computer training in a school that wants our teachers to get more training, so it looks like some things are coming down the pike. Secondarily, unless something takes a quantum leap, I'm pretty well up-to-date with things. So unless I want to get into system operations for local area networks, or what have you, I feel like I've got a pretty good command of the Internet now so its just a matter of keeping up.

Principal E: I will continue to take courses at vo-tech. With a busy schedule, you should be able to pop over there for a couple of hours, get information, come back here. I really, really want one of my own. I keep my bugging my superintendent. I go down to the lab a lot like in the summer or after school and I'll sit in the lab and do things in the lab. Play around with the computer. I have one at home so I'm able to work at home. Taking classes - I teach as an adjunct at St. Mary's, because I teach there, I can take courses there free. So I'm looking into taking some more of the technology classes there. I can read about it, and I've gotten the books, but it's more meaningful for me, personally, if I'm right there with the teacher and they're telling me. Continuing to take classes, read, and try it.

Principal H: Retire. I don't know really, to be perfectly honest with you. Maybe when I retire I might buy a computer and just sit down and learn to do it. My son will teach me. (Technology coordinator) will teach me. Just when do you find the time to do it? I just have not had the time to sit down and learn how to use them.

Principal J: With the ETTC it makes it real simple. All the hottest software, we get donated to us from the software companies. Microsoft sent us everything. You have 36 systems,

we run a 150 programs, and I can't even tell you how many participants. But with those kinds of numbers, Microsoft is saying to us here, we'll give you everything you want. They donated all their software to us. We have other company doing the same thing. If there's a new hot package out there, chances are we're going to get and I'll take a look at it. It's just going to get newer, hotter, faster.

Principal M: Again, I read constantly. One of the magazines I subscribed to is called On-line, Off-line, which comes out quarterly and each time it comes out it's on a different topic and it will give you all of the Internet sites, the CD's, the books, the videos, everything that you can use for that particular topic. Finding those kind of sources of information which you can then pass onto teachers. I think the thing that forces me the most to keep current is the increasing use of computers. We put the administrator software in this summer and then again that's going to force me to know how to use all of that. We put out a curriculum newsletter and we publish that ourselves on the computer. Getting to the point where we produce our own report cards. I want to get to the point with K-4 where our report cards change quarterly so that our report card reflects what themes we're doing, what skills are being taught that marking period and grade classes on exactly what we're doing, rather than the generic captions. Having the technology available makes you able to do so many other things but makes it very time efficient.

Principal Q: We've offered a lot of in-house workshops here at our school. I've gone to workshops myself, some in the summer. I've taken a couple one/two day courses like the Internet and using it in the classrooms and those types of things, and what have you, to keep up the speed. I know I'm not like I use to be because of my position. I don't have the access to it like I use to.

Principal R: Basically take a course this summer.

Principal W: I like the different types of magazines that come out. I'll read articles in there that pertain to my area in administration, and with the things teachers can do, and I'll pass them out to people. As new things come up, our technology specialist runs the programs, and I try to go to those, and I try to keep up that way. It's the hardest thing to keep up with in all of education for me because it happens so fast. They're so many uses, you can keep up.

Question 11. <u>What behaviors will you model for students and staff in your use of various technologies?</u>

With exception of Principal H, all of the principals acknowledged the importance of modeling to promote the utilization of various technologies in the school. For some of the principals, modeling was described in highly observable, behavioral terms: allowing staff to see

them using it. For others, it included a way of thinking, feeling, communicating, motivating, and approaching novel situations. Principals B, E and R mentioned that it is equally important to model failure and frustration as it is to model success so that novice users don't feel as if they are the only ones who are struggling to learn and apply the new technologies. Principal W shared that he is modeling students behavior more than they are modeling his.

Principal B: The first thing that comes to mind is when I walk into a classroom and I'm observing a teacher I am using the computer. As a student comes into my office they obviously see the computer on and being used. It's a good image for the students and the staff to see that I'm not intimidated by the computer. A couple months ago, I walked in on a Monday morning and my entire hard drive was gone. It had lost tremendous amounts of data, but the fact that it happened to me too showed them that just because the guy knows a lot about computers, doesn't mean that bad things can't happen to him too. You just have to be truthful with people and say this happens to everybody and its a good way to learn to back up your system and make sure that you've done things right. I think being truthful is just as valuable as showing that your proficient.

Principal E: I think I would let them see me using the technology, going down to the lab and working in the lab. Carrying the laptop with me to go in the classrooms to do evaluations. Just being excited about it. I do presentations to teachers say at a faculty meetings or with parents, using our technology rather than just going out there speaking and having it on the overheard. If they see me using it as a role model, then they're going to use it more. Both the teachers and the students. Sometimes I'll have a problem and I think that's good for them to see too. I couldn't get my page numbers right cause I started on a certain page number and I was trying to figure out a way to get around it. The teacher came over to me and said OK... I really think, being visible, talking about it, using it, and being a role model with it, is probably the best way to do it. Making it a priority. Having in-services for my teachers. Opening up the lab for parents, to have parents in. That's the best way. Having them see that we're using it.

Principal H: I hope they don't use me as a model. Not in terms of the technology. I would hope that they would listen to me when I tell them they have to learn, they have to do it, and don't look at me and say, I'm going to do what he did.

Principal J: Let them seeing us using it. I communicate with my staff members through e-mail. It eliminates some paperwork. It makes it a lot easier, plus they get a quicker response. Whereas if they were to drop a piece of paper on my desk it might take me a day or so to turn it around, this way the e-mail is pretty quick. Let them see us do it. It's that simple. Some of our staff members haven't jumped on the bandwagon as much as we would like, but I've also made them include every two weeks in there lesson plans, show me where you have done one

application with the computer. I want to see it and highlight it in your lesson plans. They see us using it, they see that we're constantly dropping equipment into their rooms, so they're using it. So modeling is the most important thing. It's such a cliché but that's true. If they see me sitting here without a computer on my desk, what are they going to think?

Principal M: With my staff, that it is time efficient. You can eliminate so much of the paperwork and be automatic, and teaching them how to use that, and once we get the administrative software, helping them see the benefits of seeing a report card that truly talks about what we're actually doing in the classroom and not just those generic topics. My continued use. If I continue to use the e-mail, and when I do faculty meetings to have it on the computer and display it, it forces them to use it. With the students, I don't know how much modeling I'm going to do with the students because usually when I go into the classroom, it doesn't have a whole lot to do with the technology. With K-4, it's usually help with reading or a project that they're doing. When I do get something nice, like from third grade, I send them a thank you, and praise them, and talk about the different skills that they've used in the newsletter.

Principal Q: Let's say a classroom observation, I'll take my think pad with me and sit there and enter the information, the data, right there. I'm always doing graphic charts for things that I create and do myself. I don't rely on my secretary so much. We put out a weekly newsletter which I just have the secretary type in the basic information and I go home and do it on PageMaker on the weekend and it goes out every Monday. I think the staff and the teachers see me doing that stuff. If they have an idea about some sort of desktop publishing or something in that area, or they want to do a spreadsheet on something, or they want to make a graph, many times they'll come to me and ask me for advice on how to do something, either with a class, the kids or whatever. Just being exposed to it and serving as a model, I think has certainly increased our use in the building. I've taught a class here on desktop publishing for my staff. I think they're coming to me because they know that I'm going to be supportive.

Principal R: Basically, we all make mistakes. We all get frustrated. When we accomplish something, we get all excited about it. I know when I published my first paper, I wrote something like this, great. Hooray or congratulations to us, you know, that kind of thing. Matter of fact, I wrote congratulations forms, my own form for that matter. It can make you feel really good or it can drive you crazy. Like if I'm working in the lab, if I can help a kid once in a while, I'll say, well I'll try, but I may not be able to handle it. If do it, they'll feel good and I'll feel good. Wow! I can't believe I did it myself. They know I'm learning too. I don't come across that I'm a know it all of everything. They think its really cool to teach me. Especially when I'm on the Internet and they teach me and they just love it. That's fine with me.

Principal W: When we send things out to parents or students, it's not the old ditto stuff anymore. It's done professionally. My secretary's excellent with those kind of things. She really puts out quality stuff. When we send things out to the teachers, like this up-date, it's done in quality. A lot of color, fonts, and it's very attractive. We do the same thing when we send things home to parents. We try showing kids, whenever possible, this is the way to go. Actually,

they show us more ways to use it. I'm more modeling their behavior then me modeling theirs. The kids are so far ahead of us because first of all they have the time, instead of kids outside playing in the snow like I use to, they're in playing on the computer.

Do you have any last comments or concluding remarks?

Three of the principals offered a concluding comment, the content of which varied in length and content. Three of the principals declined further comment. Two of the principals initially said that they had no concluding remarks and then went on to make a rather lengthy statement.

Principal B: I guess I'm really fortunate because when technology came I really embraced it from the very beginning. When I was a classroom teacher, as soon as we had a chance to get a computer, I think we're so fortunate to have one in the school in those days. I remember they gave us a grant, and I tried for the grant and I got it, and the next year I applied for another grant to get some more equipment but they said no, don't be greedy, let someone else have it. I had to wait another year to get another little piece of equipment for that computer. To think back at that level and I thought, wow, this is really got to be where it is. I remember writing to textbooks companies and saying, don't you have any companion disks, or computer disks that go with your textbooks? And they thought we were kind of crazy and now you can have companion CD ROMS that go with things. In envisioning the future, why can't we have textbooks on CD ROMS? Why can't they all be on a CD ROM tower so we don't have to play with the CD ROMS and students can do this? Oh, and another thing I envision is writeable CD ROMS are also a valuable thing. I see a big gap. Technology's been there for years but portfolio assessment can be ponderous, scanning, photographing, and documenting all the different parts of a portfolio of a child. All of it could be scanned and put on there. It doesn't matter if its a lot of memory because a CD ROM can take a tremendous amount of memory. A child's complete year of portfolio assessment can be on one CD ROM. In fact, it could be year after year if the child returns it. It could be one of the best PR devices for our school, that goes home, mom and dad see it, it goes on the computer, it could be chopped and blocked and moved around. It could be put on a website. It's fantastic. A child has a permanent record that goes with them when they go. It takes a tremendous amount of paper and reduces it, that is another thing we have to do, we have to get over this hump of using so much paper. We have a redundant system, with computers and paper. In the more advanced schools, you don't see as much paper, everything is electronic, and it saves unbelievable amounts. All of our student records could be put on CD ROMS, we could save all that space. On the other hand, an added responsibility of all this technology is that one person has to be in charge of taking the backup disks out of sight every single day. Off-site storage is something which is unfrequently done. Security is another problem. Firewalls need to be brought up. Added security where you have different servers for administrator and student usage. Databases have to be considered for

student records and state records. I think the state is ten years behind technologically. I had to type my IDEA form on this old typewriter that I can't even find replacement ribbons, they're so old. You should be able to pull it off the website, add the data you need and send it back electronically. We've got to get there. We're not there yet.

Principal E: I guess that sometimes I think, when you think about technology, I sometimes focus on the computers and I realize it's a lot of other things too. We're trying to bring that in the school, with the TVS, VCRs, and distance learning, even the use of calculators. Those are the things we're trying to work on too.

Principal M: I don't think so. At this point in time, for as much as the staff was intimidated in the beginning when all of this started to be put into place, and the training started, I would say for the majority of them now, if you asked them, do you want to go back to the pretechnology days, the answer would be an emphatic no because of the things that they've been able to do. Starting last summer, I started doing training sessions with teachers at the middle school to help them integrate curriculum. (Principal) helped implement a block schedule for 5th through 8th grade and I worked with teachers on how to develop thematic units and to have that cross-subject integration. The technology helped the teachers tremendously move in that direction because it gave them such a resource of information, like the unit on the 1920's. The teachers themselves were able to gather so much information from the Internet, and to be able to talk with other teachers who are doing this type of teaching, it helped them to make that transition from teacher-oriented, subject-oriented classes to the block schedule with the integration of the subjects. If the technology had not been in place, I'm not sure that that would have happened as quickly as it did.

Principal R: No. I think your questions were real good ones. I just went to a dinner not too long ago in Hunterdon County. Hunterdon County schools are way ahead. They are very technologically advanced in terms of, that's their focus. That really is their focus. I think the Superintendent, he is just retiring now, and he's on the president's commission of some sort, and very involved. Know the latest buzz words, whatever new software packages are coming up, and very, very in tune and involved. But regardless of whatever you do in technology, it takes more time during the day, school day's certainly not long enough, that's a problem. OK, personally, you've got these great machines, somehow it's suppose to speed things up, at the same time, it takes more time to really teach it effectively. The way our society has designed our school today, it's back in the 1800's. When you have a 180 day school year, and you have a 6 hour school day, that's really not conducive to the way we need to teach kids today. We need to deal with it in the informational end, and until that really changes we're always going to be trying to catch up and squeeze everything together. When you squeeze it, no one really gets the full meaning or the full understanding of what we're trying to do. Too many things we need to address in a 6 hour day. That hasn't changed. Everything else is changing but that hasn't changed.

Principal W: Stick where the future is. If you go into a gas station, lumber yard, they're

using a computer. It's really getting to be a technical world. It's tough on some of the older people. We do run classes at night for community people. Anybody who wants to come in and just take basic computer classes, our technology specialist does that.

Comparative Analysis of Principal Participants

The information obtained through the standardized open-ended interviews conducted with the eight principal participants resulted in both qualitative and quantitative variations in the data. Immediately obvious is the difference in the duration of the responses. Transcripts varied in length from five (Principals H, Q and W) to eight (Principal E) pages. Answers to individual questions varied in length from 4 (Principal H) to 43 (Principal E) lines of single spaced type. It is interesting to note that when principals were ranked order of computer proficiency (determined by the nature and extent of their experience with computers), the average length of response to each question (measured in terms of the number of lines in their answer) formed a bell-shaped curve. In general, the longer responses were provided by principals who possessed an average computer proficiency level; the shorter responses were provided by principals who possessed either a very high, or a very low technological competency level. In the case of the latter, a lack of hands-on experience with computers appeared to contribute to their having little to say on the subject. In the case of the former, competency levels were so high that the principals seemed to consider the various aspects and applications of technology in an educational setting so obvious that they were not worthy of detailed description.

Russell (1996) would describe this finding as highly predictable and reflective of what occurs as learners progress through the six stages of learning to use technology and "the technology moves from being intrusive to becoming invisible" (p. 634). Using Russell's (1996) model, the oral responses of principals were compared to the metacognitive reflections of

individuals at the six levels of learning in order to derive a useful context for analysis. Principal H was found to be at Stage 1, the "Awareness" level: Although conscious of the existence of various technologies, his lack of hands-on experience contributed to ambivalent feelings and avoidance of technology use. Principal R's comments were typical of a person at Stage 2: "Learning the Process." References to time-consuming assimilation of new information and skills resulted in frustration with what was considered complex technology. Principal W demonstrated an understanding of various technological processes and a more relaxed approach to the utilization thereof. As is common among those in Stage 3: "Understanding and Application of the Process," Principal W sought the assistance of members of his staff or family to advance his skills and provide moral support. At Stage 4: "Familiarity and Confidence," the learner can visualize various technological processes and anticipate logical outcomes. Principal E was found to display a growing confidence and improved self-esteem as she was now able to focus on the task, rather than the technology, and rely on her own skills and resourcefulness to solve problems without the assistance of others. It is interesting to note that just as Russell found the longest responses typically written by learners in Stage 4, Principal E similarly had the longest responses to individual questions and the greatest total number of pages of transcription. Responses provided by Principal M were reflective of persons in Stage 5: "Adaption to Other Contexts." Included in Principal M's comments were numerous references to the potential of the technology to advance her own personal and professional development, to enhance the curriculum, and to benefit student learning. Principals B, J and Q were found to be at Stage 6: "Creative Application to New Contexts." With the technology now so familiar, and their skills so advanced, the principals were able to envision new possibilities for existing and future

technologies to extend and enhance the educational environment.

An attempt to determine factors that contributed to each principal's current level of technological proficiency yielded some interesting findings. Each of the Stage 6 principals attributed their initial involvement in computers to a situational requirement that was a function of a given position of employment. None had deliberately sought out such skills. Instead, Principals B, J and Q were able to identify a time in their career when they were required to teach, design or lead a computer-related initiative. The unwitting result was a long-standing interest in the power of the medium to facilitate their own job functions and to advance teaching and learning. In effect, the rudimentary skills developed through this experience became the self-sustaining impetus behind its continued growth and development. Not surprisingly, these principals were more likely to have at least one computer in the home, own a laptop, and have access to the Internet at their home and at school.

This fact lies in sharp contrast to the experience of the two least proficient principals. Although both had served as a member or a facilitator of a technology committee, neither were required to actually utilize technology in order to fulfill their role or job function. As a result, the information gained through that experience was rarely applied and easily forgotten. Both of the principals in this group appeared sensitive to the fact that they were "behind" in the acquisition of computer skills and offered reasons such as a lack of time, poor keyboarding skills, old age, insufficient training, and the need to fulfill other obligations as a principal, as why they had not done so. Furthermore, both principals described techniques that they used to streamline administrative tasks without the use of a computer. Consequently, both administrators with the lowest proficiency levels appeared to exhibit little motivation to put

forth the time and effort necessary to gain technological skills. The principal in Stage 2 said that she intended to take steps to improve her computer skills as soon as she got the time to do so. The principal in Stage 1 said that he might find time to "sit down and learn how to do it" when he retires.

As opposed to their less technologically capable colleagues, principals in the middle proficiency levels were presently employed in a position which necessitated the application of computer skills. Whether the reason for their computer use was the expectations of superiors or computerization of the district's administrative functions, principals in Stages 3, 4 and 5 had been compelled to adopt new technologies into established routines and practices. As a result, Principals W, E and M were found to be competent and conversant in the application of various technologies to supplement curriculum, advance teaching and learning, and improve the efficiency of administrative tasks. These principals tended to own their own computer and utilize telecommunications at home and at work to improve their personal and professional productivity.

Of the six demographic variables surveyed in the participant profile, only two were found to be fairly predictive of computer proficiency: date of most recent graduation from a degree program and gender category. Of the eight principals interviewed, the two least proficient principals had received their highest level of graduate degree prior to 1977. Principals in the middle level of proficiency had earned their most recent degree in 1979, 1990 and 1995. Of the three most proficient principals, one graduated in 1988, one graduated in 1991, and although the third principal had the second earliest graduation date, 1976, this principal had remained involved in higher education by teaching graduate level classes on micro computing in

education.

Of the three women in the study, one was in the lowest proficiency category and two were in the middle proficiency group. All of the most proficient principals were men. Demographic factors that were not found to be related to a principal's level of computer proficiency included the level at which they were currently serving as principal, total years of experience in education, age when first became principal, educational background, and current age range.

With regard to district factors detailed in the 1997/1998 Warren County Technology Survey, no relationship was found between a principal's proficiency level and the number of computers for instructional use, the number of computers for administrative use, the number of computers with access to the Internet or the type(s) of connection to the Internet. In fact, the two districts with the most advanced connections to the Internet (via T-1 lines) were represented by a principal at Stage 1 and a principal at Stage 6. ISDN connections were available to principals in each of the three levels of proficiency. Five principals, one from each of Stages 2 through 6, were limited to dial-up with modem connections, the slowest of all avenues to the Internet. The number of computers with access to the Internet ranged from 164 (Principal J, Stage 6) to 1 (Principal E, Stage 4). The two other principals with the highest proficiency levels had only 5 (Principal B) and 25 (Principal Q) computers connected to the Internet.

With regard to the 1997/1998 Technology Budget Survey, no relationship was found between the proficiency level of the principal and the amount of money allocated for equipment, software, lease payment, dedicated lines for Internet access, staff, other technology-related expenditures, and the district's total technology budget. The district totals spent on technology

ranged from $51,000 to $542,000 (figures rounded to the nearest thousand), and represented two of the three principals in the highest proficiency level. The amount of money spent on dedicated lines for Internet access ranged from $300 to $18,000. The former represented two principals from the same district, one of which was in the lowest proficiency level and the other of which was in the middle proficiency level. It is interesting to note that the district that spent the second largest amount of money on Internet access charges ($15,000) was the district with the principal in the lowest level of computer proficiency.

One factor that may account for the apparent lack of relationship between the availability of technology-related resources and a principal's technological proficiency level, appeared to be the existence of a district-wide or building-based technology specialist. Four of the districts (representing Principals H, M, Q, R and W) had a technology coordinator who's sole responsibility was the orchestration of technology-related initiatives and the design, implementation and evaluation of the district's Local Technology Plan. Principal E had a building-based technology consultant who taught classes and collaborated with the principal to plan and implement technology goals. Principals B and J, both of whom were in Stage 6, did not have a technology coordinator in their district. Consequently, they maintained a great deal of responsibility for the implementation of technology in their school.

It is interesting to note that the presence of a technology coordinator appeared to exert a negative influence on the skill development and proficiency level of principals. Despite the importance of a technology coordinator, as described in the literature and by the principal participants, their existence appeared to cause principals to consider themselves no longer directly responsible for the implementation of technology in their building. Consequently,

principals who had a technology specialist in their district were more likely to delegate responsibility for technology leadership in their school and were less likely to pursue opportunities to advance their computer skills.

Another factor that may be associated with a principal's proficiency level is the amount of formal training received in the application of various computer technologies. Examination of course offerings and attendance records from the Educational Technology Training Center (ETTC), revealed that of the more than 150 courses offered by the ETTC, only two principals participated in at least one training session: Principal J (Stage 6) and Principal E (Stage 4). The course taken by Principal J was not indicated in the data. Principal E took a course entitled, "Using Spreadsheets as a Grade book and as an Instructional Tool." During the interview, Principal E explained that she took this course as the result of a graduate level course on school finance that required familiarity with Excel and the creation of spreadsheets.

Review of each district's Local Technology Plan provides additional support for the notion that one's proficiency level is largely determined by the degree to which one is required to "do something" with the technology. While the need to use technology to fulfill one's current job function tended to be associated with a middle level of proficiency, the highest level of proficiency was achieved by those who were required to teach others how to use the technology. A review of the district documentation indicated that Principal Q, a Stage 6 principal, presented several inservices on curricular applications of technology, and using technology to create thematic units and implement interdisciplinary teaching. He also organized a presentation to NJ School Boards entitled, "Technology on a Shoe String," a low cost model of staff development that was based on reinvesting the intellectual capitol of "expert" teachers on staff.

Principal B, also a Stage 6 principal, was specifically identified in the Local Technology Plan as a member of the Steering Committee and a "Source for Training and Technical Assistance Available to Staff." As such, Principal B presented workshops on "Integrating Multimedia Video and the Internet in Your Classroom" and "Understanding Technology in Grades 5-8." Principal B also helped facilitate the "Fifth Annual Regional Technology Day" presented by his district.

Once identified, the factors associated with a principals' proficiency level are only important inasmuch as they exert some influence on their ability to lead a technology-related initiative. In order to study each principal's particular leadership approach, interview responses were examined in relation to the nine empirically derived leadership practices detailed in the study conducted by the Southern Technology Council (1997). Immediately following each of the nine leadership strategies is the percentage of principal participants who mentioned using that particular approach: "Administration demonstrated concern about access to computers for all students," 100%; "Administration identified a "champion or technology leader in the school who had responsibility for managing the change process," 100%; "Administration actually used the technology in administrative and/or instructional settings" 75%; "Administration addressed teachers and staff fears and anxieties abut technology," 50%; "Administration created and empowered a group within the school to oversee and manage the change process involving educational technologies," 33%; "Administration held regular meetings to review progress relative to the technology plan," 12.5%; "Administration linked to the community, parents, and/or corporate leadership to support and participate in technology implementation," 100%; "Administration tracked progress in implementation of education technology," 100%;

"Administration developed a presentation about the school's technology efforts," 12.5%.

In order to examine differences among principals in the number of leadership approaches used, an aggregate leadership index that involved summing the number of leadership approaches used by each principal was determined. Results indicated that when principals were organized in order of their stage of technology learning, the total number of leadership approaches used formed a bell-shaped curve that was almost identical to the pattern derived from the total number of pages of transcription. Principals in the middle proficiency level tended to use the greatest number of leadership approaches while principals in the high and low proficiency levels used less. The number of leadership approaches ranged from 3 (Principal H, Stage 1) to 8 (Principal E, Stage 4), a finding remarkably similar to that obtained by analysis of the average duration of principal's responses to interview questions.

Within each category, additional inter-principal variations emerged. While all of the principals expressed concern about increasing access to computers and the Internet, the principals in the middle proficiency level were more likely to define access in the manner advocated by Maddux (1994). According to Maddux, the concept of access should be defined as "availability to something educationally beneficial," (p. 38) rather than physical proximity of hardware. Principals in the high and low proficiency levels tended to define their school's current status and technological mission in terms of quantifiable aspects of computer hardware (i.e. the location, type and number of computers in the school) rather than applications of the equipment for educational purposes. As such, their plan to move toward the realization of computer-related goals involved the acquisition of additional funds and hardware. Principals in the middle proficiency level tended to supplement the quantifiable aspects of computer

resources with the way the technologies were being used to enhance curriculum and instruction. These principals were also more likely to cite the advantages of administrative applications of technology and use of computers to streamline the efficiency of the library.

All of the principals identified an individual who served as the "champion" of technology in their school or district. Principals who served in districts with a technology coordinator pinpointed that individual as the technology leader. Of the three principals who mentioned someone other than the technology coordinator, two identified their superintendent as the technology leader and one identified himself. Principals B and J described their superintendent as extraordinarily supportive of technology and highly skilled in its application. (Principal J referred to his superintendent as a "techno nut.") Principal Q, who served as a technology coordinator in his previous district, discussed the active role that he has played in introducing and integrating technology in the middle school in which he is principal. It is interesting to note that all three of these principals were in Stage 6, the highest level of technology learning.

With regard to an administrator's personal use of technology, six of the principals described various ways in which they used technology for administrative or instructional purposes. Principals B, E, J, M, Q and W described the critical function that the principal plays as a role model in the use of technology. Furthermore, many believed that their effectiveness and credibility were enhanced by allowing others to witness the feelings and frustrations that they experienced as they struggle to learn the new technologies. Principal H (Stage 1) and Principal R (Stage 2) conceded that they did not use a computer.

The tendency of a leader to address the affective dimension associated with learning new

technology was the only leadership approach for which there was a clear distinction between the leadership styles of men and the leadership styles of women. Regardless of their proficiency level, all three of the female principals made numerous references to the importance of addressing the fears and anxieties of staff members engaged in technology learning. Principal B (Stage 6) was the only male to do so. Principals J, H, Q and W made no mention of the feelings of staff.

Principal E (Stage 4) and Principal M (Stage 5) were the only two principals to mention the existence of a group empowered to oversee the change process. With respect to the former, Principal E discussed her involvement on the district technology committee that was working to develop and implement a technology plan. With respect to the latter, Principal M described a group of 15 teachers who were participating in a program sponsored by Steven's Institute of Technology. Principal M described the purpose of the program as the advancement of K-12 instruction in the areas of Science and Mathematics through the application of computers and telecommunications. In the districts without a specific group created to oversee the integration of technology, the person identified by principals as responsible to fulfill this function was the individual named as the "champion" of technology.

While every principal mentioned the importance of the district's Local Technology Plan to guide the systematic integration of technology in their school, the only principal who conducted regular meetings to assess progress relative to the technology plan was Principal E (Stage 4). The reason for Principal E's utilization of this strategy appeared to be that the district had not yet provided students with access to on-line resources and was thus working with a committee to address the safety and security issues associated with Internet access.

All of the principals mentioned the role that the Educational Teacher Training Center (ETTC) has played in training their staff to effectively implement technology. In addition, Principal B described the significant savings that have resulted from his district's opportunity to connect to the Internet via lines made available through ETTC. Partnerships with other institutions included Centenary College, Steven's Institute of Technology and an unnamed local Internet service provider. Principals whose districts were involved in such collaborative efforts noted benefits in the areas of training, technical support, discounted rates for Internet access.

Although few of the principals played a direct role in the monitoring of progress toward technology-related goals, all were able to provide various examples to illustrate how far the district had come, and the direction in which it plans to move. With regard to the factors described by Hawkins (1996) as critical in the transition from stand alone hardware to connectivity: Principals B, J, H, Q, R and W mentioned replacing outdated equipment; Principals B, E, J, M, Q and W discussed the movement of equipment from lab settings to classrooms; Principals B, E, J, M, H, Q and W described revised budgetary priorities and procedures; Principals B, E, J, M, Q and W stressed the need for additional training, software and technical support; and all principals discussed the role that various alliances with business or education have played in the advancement of technology in their district.

Principal Q was the only principal to develop a presentation about the school's technology efforts. Principal W, however, mentioned that his district offers free computer classes to members of the community and Principal H noted that a school-sponsored demonstration for parents would be the most effective way to communicate the educational opportunities made available through the Internet.

The role of the principal was universally characterized as a provider of resources and administrative support. All of the principals shared the belief that in order to further integrate computers into schools, teachers and students must be provided with additional resources and Internet access points. The ability to identify all of the resources necessary to support a fully integrated technology initiative, however, tended to vary among principals. Principals in the lowest proficiency level tended to limit the discussion of necessary resources to the acquisition of physical resources (i.e. computers, lines to the Internet). Principals in the middle and high proficiency levels tended to include a broader range of resources, including staff development, time, money, Internet and Intranet access, software, site licenses, and additional support staff in charge of maintenance, repair and instruction.

Principals' perceptions regarding advantages and disadvantages of providing students in their school with access to the Internet seemed to vary in relation to their degree of familiarity with the medium. Although all principals described the Internet as a means to obtain a vast amount of information, principals who regularly used computers and on-line services were more likely to describe the ability to use the Internet as an essential basic skill in an information age and as a means by which to develop higher level thinking skills.

In addition, computer proficient principals were more aware of the limitations and liabilities associated with on-line learning. Although there was some disagreement among principals as to the ability to screen objectionable sights from the Internet, all agreed that a great deal of planning and vigilance was necessary in order to ensure the appropriate utilization of on-line resources. All of the principals, except Principal B, specifically mentioned the use of a contract, signed by each student and his or her parent, as the means by which the guidelines for

appropriate use, and the consequences for the violation thereof, were communicated and enforced. It is interesting to note that when probed, none of the principals had developed a contingency plan in the event that a student and/or parent refused to sign the document. Administrators named parents, teachers, students and the district technology coordinator as responsible for acceptable use of on-line resources. None of the administrators mentioned their role in that responsibility.

The two principals who had little or no experience with the Internet (Principals H, Stage 1 and Principal R, Stage 2) tended to speak of the advantages and disadvantages of Internet access in broad generalities and only vaguely addressed the issues presented in the interview questions. Furthermore, analysis of the language used in their responses revealed a higher incidence of computer-related terminology or technological jargon that was used incorrectly, suggesting that they lack the background knowledge necessary to use these terms properly. In addition to the concern that this raises with regard to their ability to effectively supervise the utilization of various educational technologies in their school, the effect on one's credibility when dealing with a knowledgeable constituency must also be considered.

All of the principals predicted a change in the educational environment in the coming decade. Within each vision, computers and connectivity assumed a central role in the classroom of the future. Principals' perspectives regarding the implication of this notion tended to vary in relation to the amount of experience they had with computers and on-line services. Principals in the middle and high proficiency levels predicted an increase in the use of the Internet to facilitate teaching and learning, supplement and connect various curricular areas, create a more student-centered environment, and expand the classroom to include the global community. Less

proficient principals tended to focus on greater accessibility of computer equipment.

With regard to the human dimension of public education, principals of all proficiency levels attested to the continued importance of the teacher in the classroom of the future. Principal H, however, suggested that the number of administrators needed to run a school may be reduced, presumably due to the automation of various administrative function. Principal J, on the other hand, asserted that the most significant changes in education will occur when technologically proficient principals, "begin to take over and knock out some of the older individuals that have not made a change or the adjustment towards technology."

The means by which each principal planned to establish and update their skills varied in relation to each principals stage of technology-related learning. Each of the principals in Stage 6 stated that unless the technology took a "quantum leap" all they needed to do was "keep up." Principals M (Stage 5) and E (Stage 4) mentioned the need for additional training and a desire to learn the "nuts and bolts" of the technological processes they were quite capable to employ. Principal W (Stage 3) said that he would try to attend some of the inservices offered by the district technology coordinator and continue to learn from his son and secretary. Principal R (Stage 2) hoped to take a class at ETTC during the summer. Principal H (Stage 1) indicated that he planned to retire.

Chapter V

Summary, Conclusions and Recommendations

Summary

The role of the school in the preparation of America's youth for meaningful and productive participation in a democratic society is one which is well grounded in the roots and traditions of American culture. And while the role of that institution may have remained largely unchanged for the past 400 years, the culture for which schools prepare children has become radically different. In order to prepare today's students to become tomorrow's citizens, schools must adapt to meet the changing needs of the society it serves. Within the school, it is the principal who bears the responsibility to lead and change the organization. As such, the principal may serve to promote or prevent any attempt to alter the nature of what constitutes the educational experience provided by a school.

In the "Information Age" of the 21st century, the ability to access, analyze and apply information will become the single-most important factor that will determine the success of an individual. The Internet, an interconnected, interactive global network, is the most powerful information tool the world has ever seen. As such, it offers institutions of learning unprecedented power, promise and problems. That schools will continue to move toward the integration of the Internet is certain. What is less certain is the readiness of building level principals to manage the concomitant pedagogical challenges associated with Internet access. The purpose of this study was to examine the perceptions of principals regarding the integration

of the Internet into public elementary and secondary schools. This study was intended to contribute to a growing body of research that examines the role of the principal in the introduction, integration and utilization of the Internet within the public school setting.

In order to develop an understanding of the issues facing principals as they facilitate the integration of technology in schools, a comprehensive review of the literature related to the history of educational technologies in schools was undertaken. In addition, information regarding the educational risks and benefits of Internet access, along with statistics regarding the proliferation and utilization of on-line resources was used to determine the current status of educational computing in United States public schools. An analysis of educational research that specifically addresses the role of the principal in the integration of computers in general, and the Internet in particular, concludes the review of related literature.

This study was conducted in Warren County, New Jersey. As an area marked by vast, undeveloped farmlands on the banks of the Delaware River, Warren County reflects the kind of rural community that stands to benefit much from the potential of telecommunications to remove or reduce the deleterious effect of geographical isolation and low socioeconomic status. The school districts represented in the study include six schools with a district factor grouping of DE, one school with a district factor grouping of FG and one regional school that does not have a DFG rating. The participants in the study included eight principals: two from a K-8 school, three from a middle school, and three from a high school.

Because the intent of the study was to examine human perceptions, a qualitative methodology was employed. A standardized, open-ended interview instrument was designed to elicit information regarding participants beliefs, attitudes, feelings, behaviors, knowledge and

experience associated with utilization of computers within an educational setting. Also included in the study was an analysis of demographic data related to the participants. Content analysis was used to analyze the data obtained through the open-ended interview instrument and triangulation of sources was used to enhance the validity of the research findings.

The emphasis of this study focuses upon the original research questions stated in the problem of the study. The following is a list of the research questions and generalized answers derived from the principals who participated in this study.

Question 1. How do principals believe schools can best prepare students for the demands of both the current and future information age?

Active and meaningful participation in the information age was considered by all principals to be predicated on the ability to use computers. There was a general consensus among principals that it was the school's responsibility to provide children with direct instruction and experience with computers so that they would develop the ability to use them in a manner that was effective, efficient and ethical. The Internet was described by all of the principals as a powerful information tool that has the potential to fundamentally alter the way children think and learn. Although principals' perspective on the risks and benefits of Internet access tended to vary, there was complete agreement that the ability to use the Internet to obtain, analyze, synthesize and apply information would be a necessary prerequisite for life in the twenty first century.

Question 2. According to principals, what is the role of information technologies in schools?

Common among all principals was a view of the computer as a unique tool that has the

potential to enhance instruction and advance educational outcomes. While recognizing the unprecedented power of the medium, however, the principals believed that the computer would continue to supplement, but not supplant, existent educational structures in school. Several of the principals asserted that despite the vast amount of information made available to children via the computer, either through software programs, CD ROMS or the Internet, the teacher will remain central to the educational process. The role of the teacher, however, was expected to change. The majority of principals believed that once universal access to on-line resources was established, the teacher would become more of a facilitator of learning, than a disseminator of information. For many principals access to the Internet meant instantaneous availability to a vast amount of information. As such, the need to memorize and "regurgitate" facts is replaced by the need to understand how to analyze, synthesize and evaluate the information obtained through on-line resources. In order to facilitate this shift from product to process, principals predicted that teachers would have to shift their teaching styles from a didactic approach to a more project-based approach. By assuming a constructivistic theory of learning, principals anticipated a more autonomous, student-centered classroom environment.

In addition to its role as a curricular tool and an instructional tool, principals in the middle proficiency level described the use of technology as an administrative tool that has the potential to maximize efficiency and minimize the time spent on organizational and managerial tasks. By doing so, these principals believed that more time would be available for teachers and administrators to engage in more meaningful pursuits.

Principal B was the only administrator to address the ability of the computer to serve as assessment tool. This administrator, who was one of three in the highest proficiency level,

discussed the use of electronic portfolios as a means to document performance-based proficiencies gained throughout a child's entire educational experience, communicate a child's progress and performance to parents, and serve as "one of the best PR devices for our school."

Question 3. What do principals consider the role of schools in the age of information technology?

All of the principals spoke of the need to prepare students for life in an information age. Central to that notion was the ability to serve as an information consumer and producer on the "information superhighway." As such, principals described the role of the school as the primary agency to teach children how to access, analyze and apply information obtained through various electronic sources. Principals believed that schools must also teach children how to operate within these mediums in a manner that is ethical and efficient. The goal for schools, therefore, is twofold, and it involves both process and product. Students must become not only technically proficient in the ability to demonstrate a given set of skills, but they must also learn how to cope and adapt to a rapidly changing and highly fluid environment. Both were considered absolutely imperative by all principals in order for students to be able to "compete" in the workforce and in higher levels of education.

Question 4. What do principals identify as the potential risks and benefits of providing children with access to the Internet?

Principals varied greatly in their ability to speak directly to issues pertaining to the risks and benefits of providing Internet access to children in schools. Of the eight principals interviewed, seven had experience with the Internet and one did not. The principal who had not had the opportunity to utilize on-line resources tended to speak in broad generalizations about

the educational risks and benefits and was more likely to express concern about inappropriate access to objectionable sites. Those with Internet experience were more likely to cite specific examples of lessons and activities in which the Internet had been used by teachers to enhance teaching and learning. These principals were also more likely to describe the Internet as a means by which to cross traditional disciplinary lines and make learning more integrated, relevant, exciting and connected to "real life" experience.

All of the principals shared the perspective that the responsibility for appropriate use of the Internet in schools must be shared by parents, teachers and students. Central to this notion was the use of an acceptable use policy that details appropriate and inappropriate use of on-line resources. Principals planned to communicate and enforce this policy through the use of a contract that would be sent home with every student to be carefully reviewed and signed by both the student and his or her parent. Principals spoke of this signed contract as each student's "ticket" to the Internet. When probed, however, none of the principals appeared to be prepared for the possibility that a student and/or parent may refuse to sign the agreement as none of the districts had a contingency plan in place in order to guide the school's response in the event that this should occur.

Only two principals, both of whom were in the middle proficiency level, appeared concerned about the potential negative effects of increased computer use on children. Cause for their concern was their observation that the more students use computers, the more isolated they become. Both of the administrators said that they had witnessed a decrease in student interaction and a deleterious effect on student's socialization skills.

Question 5. <u>What do principals consider necessary to effectively plan, implement and</u>

maintain a technologically integrated educational program that includes access to the Internet?

All of the principals highlighted the importance of the district's Local Technology Plan to guide the introduction and integration of various computer technologies into the existing educational program. These principals believed that a well articulated strategic plan would keep the district on a steady course toward the acquisition of new technologies, the replacement of antiquated technologies, and the progressive integration of all technologies into teaching and learning.

Principals who had a technology coordinator in their district were most likely to name that person as the individual responsible for technological leadership. Principals who did not have a technology coordinator in their district tended to describe the importance of their role as a leader of technology in their school.

All of the principals believed that a successfully integrated technology program would require the need for on-going staff development and training. It was widely recognized that the teachers need to be proficient in their use of the medium if they are expected to teach children how to use it. Of equal concern was the need to teach teachers how to use the computer and on-line resources to supplement and integrate the curriculum, enhance instruction and assess educational outcomes.

Question 6. What do principals describe as barriers that impede successful integration of educational technologies in schools?

Data obtained from principals indicated strong support for the use of computers and on-line resources in the classroom. Several barriers, however, were identified by administrators as significant in their deleterious effect on the "seamless" integration of electronic services in

schools. Principals reported that: a lack of staff development and training; lack of time to learn how to use; outdated or broken computer equipment and peripherals; a paucity of Internet access points; an inadequate infrastructure; insufficient funds; parental concern regarding protection of students; and a lack of technologically skilled support staff to install, maintain and repair equipment inhibited optimal use of computer resources. The issue of "time" was the most common barrier identified by principals as inhibiting their ability to keep up with the rapid pace of technological change.

Question 7. How do principals characterize the role of the principal in the introduction, implementation and integration of the Internet in schools?

The principal's role in the integration of computers was consistently viewed as a provider of resources and administrative support. In this respect, all of the principals described the need to provide staff with the equipment, access and training necessary to utilize computer resources effectively. They also identified the importance of communicating the expectation that all staff members would become proficient in the use of the computer. Principals described various means by which this could be accomplished: including technology-related goals and objectives in staff member's Professional Improvement Plan, addressing technology-related accomplishments in annual evaluations, requiring the evidence of technology utilization in teacher's lesson plans, and hiring individuals who were already skilled in the use of technology for instructional purposes.

Four of the principals, however, went beyond the level of physical resources to identify the importance of meeting the affective needs of staff members who are learning and experimenting with emerging technologies. For these principals, the importance of creating an

open and emotionally supportive environment that encouraged risk-taking and experimentation was an essential part of their role as a change agent.

Question 8. How do principals intend to establish and to update their knowledge and skills of the most current uses of technology in education?

Common among all principals was a view of technology as a race against time. With the exception of the principals at the highest level of proficiency, principals appear to consider the ability to keep up with emergent technologies as one of the greatest challenges that they face as administrators. The method by which principals intend to develop their computer skills varied in relation to the technological proficiency level of the administrator. Principals who had achieved the highest level of technology proficiency planned to remain current by "playing" with new technologies as they become available. For these principals, the on-going process of learning to use and apply new technologies was a matter of accommodation - applying previously acquired understandings to new circumstances. Principals who had achieved a middle level of technological proficiency discussed the need for ongoing training and hands-on experience in order to acquire and advance their computer skills. These principals planned to take advantage of inservice training offered in the district, courses offered at the ETTC, and opportunities to participate on committees charged with leading technology initiatives in the district in order to further their understanding of computer applications and the "nuts and bolts" that support technological processes. Principals with a low level of expertise intended to keep abreast of changes in the area of technology by reading trade magazines and learning from others on an informal, as-need basis. Although principals in the lowest proficiency levels conceded that they "should" develop their skills, the principals appeared to focus more on why they were

unable to do so, than what they intended to do to remedy the situation.

Question 9. What personal, educational or institutional factors appear to shape principals' perceptions regarding the utilization of the Internet in schools?

The findings of this study suggest that principals perceptions regarding the use of computers in general, and the Internet in particular, are largely determined by the nature and extent to which the principal has used the technology. Whether the reason underlying a principal's first experience with technology was the need to use it to fulfill a job function, a requirement of a graduate level class, personal initiative or the expectations of superiors, use of computers provided principals with experience, that developed confidence, and resulted in more use. Taken in sum, the three factors of use, experience and confidence contributed to a comfort level that was based on cognitive skills and affective dimensions. The more comfortable a principal was with a given technology, the more proficient he or she tended to be in its use. As such, analysis of personal, educational and institutional factors yielded significant results only inasmuch as they affected one of these three factors, the most important of which was use. Factors that were associated with a high level of use included: the nature and degree of hands-on computer experience necessary to fulfill present or previous job functions; the need to teach others how to use hardware, software or on-line resources; and recency of enrollment or instruction in post-graduate degree programs. A factor that was found to inhibit use was the presence of a technology coordinator. Principals who had not acquired a basic level of technological proficiency prior to the addition of a technology coordinator on staff were less likely to pursue opportunities to advance their skills and more likely to use the computer as little as possible. Principals who had already obtained a middle level of technological proficiency, on

the other hand, were more likely to continue to use computers and seek opportunities to improve their skills. Principals who had acquired high levels of computer expertise tended to remain actively involved in leading technology initiatives in their school.

Overview of the Conclusions

The findings in this study suggest that the perceptions of principals regarding the integration of the Internet into the public school setting are largely determined by the nature and degree of direct experience the principal has had with the medium. As the technology moves from "intrusive to invisible," principals' attitudes and behaviors progress through a predictable series of stages that have significant implications for their ability to successfully lead the implementation of technology in schools. Factors that were associated with a principal's stage of technology learning included: the nature and degree of hands-on computer experience necessary to fulfill present or previous job functions, particularly the need to teach others or act as the school's technology leader; recency of enrollment or instruction in post-graduate degree programs; gender; and presence of a district technology coordinator.

The proficiency of a principal appeared to influence the degree to which the administrator was able to address the array of issues associated with Internet access in schools. Principals in the low proficiency levels, appeared to lack the knowledge and experience necessary to thoroughly address the issues presented in the interview questions. Principals at the highest proficiency levels appeared so highly skilled and knowledgeable that they made reference to the key technical and pedagogical issues associated with Internet access, but did not provide a great deal of detail regarding them. For these principals, it seemed that the technology was so familiar that the issues were self-evident and therefore did not require a long-winded

statement of the obvious. Principals in the middle proficiency level, on the other hand, tended to provide longer responses that addressed the issues pertaining to the Internet with greater breadth and depth.

Recommendations for Public Schools

Although all of the participants attested to the importance of incorporating the use of on-line resources into their school, only three quarters of them appeared to posses the skills and abilities to work effectively in this capacity. Consequently, the importance of training administrators cannot be underestimated. It is equally important, however, that while principals work to advance their skills, the district continues to progress toward the incorporation of technology into classrooms. It is therefore strongly suggested that each school district retain the services of a well trained technology coordinator who specializes in the educational application of technological resources. Small school districts, or those for which a full time technology coordinator would be cost prohibitive, may consider establishing a shared services agreement with a neighboring district. By doing so, both districts can benefit from the services provided by a technology coordinator while minimizing the financial impact incurred by the district.

The role of the technology coordinator should be twofold: to assist in the development of a clearly articulated strategic plan and facilitate the implementation of that plan in the buildings throughout the district; and to train building level administrators to serve as leaders of technology in their school. The technology plan, should reflect the importance of both of these key elements. Roles and responsibilities should be clearly delineated so that principals understand that the presence of a technology coordinator does not absolve them of their responsibility to technology leader. Central to the role of the technology coordinator is the

involvement of principals, parents, teachers and community members in the development of the district technology plan. By doing so, districts are ensured that everyone understands the purpose and priorities of technology in the district's schools.

As administrators become involved in the development of a technological mission, they will begin to develop an understanding of the conceptual issues that surround classroom utilization of computer technologies. Too often, administrative technology training focuses on how to use the technology with little emphasis on the conceptual or strategic skills required of effective leaders. An essential part of administrative training must include how technologies can be used to enhance curriculum and instruction, augment and assess student learning, and promote administrative efficiency.

In order to appreciate the conceptual issues involved in the educational application of various technologies in the classroom, principals must possess at least a basic facility with computers and on-line resources. An on-going program of differentiated instruction should be established to teach principals computer skills within the context of their particular setting. Instruction should begin with relevant, real-life tasks such as word processing and e-mail and gradually advance to technology-related activities such as inservice staff training and the development of technology plans. Specific instruction designed to facilitate an understanding of computer platforms, Internet access and service providers, the physical and electrical infrastructure necessary to support classrooms and computer labs, administrative security and the legal and ethical issues surrounding the use of various computer technologies should also be included.

In order address the fears and anxieties of principals as they struggle to learn and apply

new technologies, administrative training programs should include explicit instruction in the six stages for learning new technology that were validated in the study by Russell (1996) and further substantiated in this study. By becoming aware of the feelings and frustrations that typically accompany the progression of skills associated with the stages of learning, principals may be less likely to feel inadequate or incompetent during their nascent computer experiences.

Principals should then be encouraged to incorporate their awareness of the six stages of technology learning into their style of leadership. Of the five men and three women who participated in this study, only one of the men mentioned the importance of providing staff members with the emotional support necessary to help them adopt new technologies into existent practices. All three of the women did. Although the small sample size used in this study precludes the ability to draw conclusions about the relationship between gender and one's technology leadership style, the importance of making all principals aware of this critical dimension of support appears warranted.

Findings from this study suggest that principals who are asked to "turn key" what they have learned, demonstrate a significantly higher level of computer proficiency than those who are not asked to do so. As any teacher will attest, the best way to learn something is to have to teach it. An effective component of a principal training program would be to include a requirement that principals must share what they have learned with another individual or small group.

In order to truly master new skills, principals need the opportunity to practice them in a relaxed and non-threatening environment. One of the principals in this study did not have a computer in his home. Arrangements should be made with the central office to loan or lease

principals a computer for home use if they do not own one. By actively experimenting with various computer applications in the home, principals may develop the confidence and competence to apply those skills in the workplace.

A necessary prerequisite to the success of any technology program is the procurement of resources. Principals must know both the costs and kinds of resources necessary to provide an integrated technology program and understand the best way to deploy resources in order to maximize the cost/benefit ratio of allocated funds. Too often principals focus on acquiring additional equipment and neglect the resources of time, training and software. Such a one dimensional approach ignores many of the essential elements of a successful technology program.

In order to obtain necessary resources, districts should pursue opportunities to establish alliances with businesses and educational institutions. By doing so, much of the costly and time-consuming responsibility for training and technical support may be shared with the partner organization. In addition, Internet access can be significantly enhanced by the increased speed and reduced charges associated with connecting to on-line resources via local Internet providers.

In the same way that students and teachers must be provided with a safe and supportive environment in which to try new things, the affective needs of principals struggling to master the tools of technology must be addressed and considered by central office administrators. Administrators with limited technology experience should be provided with individualized instruction, time to practice, and a low-risk environment in which to do so. In addition, support personnel should be readily available to provide technical assistance to principals in the event of a problem. Central office administrators should also clearly communicate an expectation that all

principals will master basic technology skills and that they will continue to work to develop and refine these skills over time. Progress in this area should be recognized and included in principals' annual evaluations.

The results of this study suggest that one of the most effective ways to facilitate the integration of technology into a school is to have a dedicated, enthusiastic and experienced technology leader. School districts that have the opportunity to hire a new principal should include in their list of requisite skills the ability to use technology to enhance curriculum, instruction, assessment and administrative efficiency. By selecting a principal who is already proficient in the use of various technologies, the likelihood is greatly increased that technology will be successfully adopted and implemented in the school.

Recommendations for Future Research

The participants in this study included randomly selected principals in rural, Warren County in the state of New Jersey. As such, the findings of this study are generalizable to only a narrow and select group of school districts. A similar study conducted on a more widely representative sample may yield different results. Future research should include principals who serve in school districts with different district factor grouping designations, are located in various geographical locations and include a more diverse student population with respect to demographic characteristics.

The literature is replete with studies that describe the critical role of the principal in the introduction, integration and implementation of computer technology in schools. Most of these articles, however, appear to assume that the principal is skilled in the application of such technologies. As such, the majority of studies focus on methods by which the proficient

administrator can move or motivate a reluctant staff to incorporate these resources into their respective job function. The results of this study suggest that this assumption is false. Principals vary greatly in their degree of knowledge and proficiency in the use of educational technology. Of the eight principals who participated in this study, two were found to lack technological proficiency, two indicated a middle level of proficiency, and three were found to be highly skilled in the educational application of advanced technologies. If the principal is considered the critical component in a successfully integrated technology program, then the impact of a principals' level of computer proficiency on the nature and incidence of computer utilization is worthy of investigation. An interesting extension of the present study would be to determine whether differences in the utilization of computer technology in the district's schools varies in relation to the proficiency of the principal.

Similarly, further investigation into the leadership styles of male and female principals charged with the implementation of technology in their school may yield important differences that effect the success of the initiative. For adults, learning to use technology can be traumatic. As such, staff members require a great deal of emotional support in order acquire the skills and confidence necessary to incorporate new technologies into existent routines and practices. A more thorough examination of gender-based differences in the ability or tendency of principals to address this dimension of technology learning would beneficial.

All of the participants in this study expressed an interest and desire to continue to develop their knowledge and skills in computer technology. The results from this study, however, suggest that those who are already proficient in the use of educational technologies will continue to actively seek out opportunities to improve their skills while those who are less

skilled may tend to avoid or resist such opportunities. A longitudinal study designed to investigate whether the gap between the "cans" and "cannots" continues to narrow or widen over time would appear to have merit considering the powerful forces that are compelling schools to take their place on the information superhighway and the dire consequences for those who do not.

References

Armstrong, D., Davis, R. & Young, G. (1996). Technology integration at the middle and high school levels: A model for staff development. NASSP Bulletin, 80 (582), 81-88.

Barker, B. O. (1995). The Internet and World-Wide-Web: Potential benefits to rural schools. ERIC ED 401 064.

Barker, B.O., & Taylor, D.R. (1993). An overview of distance learning and telecommunications in rural schools. ERIC ED 365 502.

Brown, R.H., Barram, D.J., & Irving, L. (1995). Falling through the net: A survey of the "have nots" in rural and urban America. US Department of Commerce. (http://www.ntia.doc.gov:70/00.newitems/urb-rur.txt.).

Becker, H.J. (1992). Top-down versus grass roots decision making about computer acquisition and use in American schools. ERIC ED 356 769.

Bennett, C.K. (1996a). Schools, technology, and educational leadership: A framework for change. NASSP Bulletin, 80 (577), 57-65.

Bennett, C.K. (1996b). Talking technology: Introduction. NASSP Bulletin, 80 (582), 1-2.

Blase, J.J. (1986). A qualitative analysis of sources of teacher stress: Consequences for performance. American Educational Research Journal, 23 (1), 13-40.

Bossert, P.J. (1996). Understanding the technologies of our learning environments. NASSP Bulletin, 80 (582), 11-20.

Carter, M. T. (1997). Factors affecting use of E-mail by public school principals of the Central Appalachian Region. ERIC ED 408135.

Cohen, M., Levin, J. A., & Souviney, R. (1986). Exemplary educational computer use: Coping with rapid changes in technology. Interactive technology laboratory report #12. ERIC ED 311 875.

Drucker, P. (1994). The age of social transformation. Atlantic Monthly, 274, 53-67.

Dyrli, O.E., & Kinnaman, D.E. (1996). Energizing the classroom curriculum through telecommunications. Technology and Learning, 16, 65-70.

Dwyer, D.C. (1984). The search for instructional leadership: Routines and subtleties in the principal's role. Educational Leadership, 41 (5), 31-37.

Edwards, C.M. Jr. (1995). The Internet high school: A modest proposal. NASSP Bulletin, 79 (573), 67-71.

Flanders, B. (1994). A delicate balance. School Library Journal, Oct, 32-35.

Fetterman, D. M. (1989). Ethnography: Step by step. Thousand Oaks, CA: SAGE.

Gainey, D.D. (1994). The American high school and change: An unsettling process. NASSP Bulletin, 78 (560), 26-34.

Getting America's Students Ready for the 21st Century: Meeting the Technology Literacy Challenge. (1996). Technology literacy: A national priority. (http://www.ed.gov/Technol...chPlan/priority.html).

Glennan, T.K., & Melmed, A. (1996). Fostering the use of educational technology: Elements of a national strategy. Washington, DC: The RAND Corporation.

Gutek, G.L. (1988). Education and schooling in America. Englewood Cliffs, New Jersey: Prentice Hall.

Hawkins, J. (1996). Technology in education: Transitions. National Education Summit: Briefing book. (http://www.summit96.ibm.com/brief/papers/transit.html).

Hodas, S. (1994). Cyberspace superhighways: Access, ethics and control. (gopher://riceinfo.rice.ed...More/Acceptable/eric).

Hoffman, B. (1996). Managing the information revolution: Planning the integration of school technology. NASSP Bulletin, 80 (582), 89-98.

Hundt, R. (1996). Providing opportunity for all through the telecommunications revolution. NASSP Bulletin, 80 (582), 3-10.

Kearsley, G., & Lynch, W. (1994). Educational technology leadership perspectives. Englewood Cliffs, NJ: Educational Technology Publications.

Kirk, J. (1987). Information skills: An educational perspective for tomorrow. ERIC ED 359 981.

Lankes, R. D. (1997). The bread and butter of the Internet. (http://ericir.syr.edu/ithome/digests/David.html).

Latcher, L.E. (1996). Documented success. Beyond Computing, 5.

Leedy, P.D. (1997). Practical research: Planning and design. Upper Saddle River, NJ: Prentice-Hall, Inc.

Levinson, E., Doyle, D., & Benjamin, R. I. (1993). Technology and change. Executive Educator, 15 (10), 20-24.

Lord, M. (1995). Cyberjobs. U.S. News and World Report, 119, (17), 76-85.

Maddux, C. D. (1994). The Internet: Educational prospects and problems. Educational Technology, 34 (7), 37-42.

Malarkey-Taylor Associates, Inc., Washington, DC. (1995). Education technology survey. ERIC, ED 387 124.

Marcinkiewicz, H.R. (1994). Subjective norms predicting computer use. ERIC, ED 373 739.

Market Data Retrieval. (1994). New Jersey School Directory. Shelton, CT.

Market Data Retrieval. (1996). Schools that are using the Internet: Who are they? NASSP NewsLeader, 44, 2, 6.

Marsh, G. (1993). Computers: Literacy and learning. A primer for administrators. ERIC ED 358 547.

Maskin, M.R. (1996). "Infotectives" on the "Infobahn": Designing internet-aided projects for the Social Studies classroom. NASSP Bulletin, 80 (582), 59-70.

Mayer, M. (1997). The state networking report: Progress, policies and partnerships bring Internet connectivity to K-12 schools. ERIC ED 409 003.

Mecklenburger, J.A. (1989). Technology in the 1990's: Ten secrets for success. Principal, 2, 6-8.

National Center for Missing and Exploited Children. (1994). Child safety on the information highway. [Brochure]. Magid, LJ: Author.

National Center for Education Statistics. (1997). Digest of Education Statistics 1997. Washington, D.C.: U.S. Department of Eduation.

National Center for Education Statistics. (1998). Issue brief: Internet access in public schools. (http://nces.ed.gov/pubs98/98031.html.).

Neiderhauser, D.S. (1996). Using computers in an information age classroom: What teachers need to know. NASSP Bulletin, 80 (582), 71-80.

New Jersey State Department of Education. (1996). Core curriculum content standards. Trenton, NJ: Author.

New Jersey State Department of Education (1995). Strategic plan for systemic improvement of education in New Jersey. Trenton, NJ: Author.

Office of Educational Research and Improvement. (1994a). Information literacy in an information society. Washington, D.C.: U.S. Government Printing Office.

Office of Educational Research and Improvement. (1994b). Networking in the classroom. Rural, small schools network information exchange no. 16. ERIC ED 383 484.

Office of Technology Assessment. (1989). Linking for learning: A new course for education. Washington, D.C.: U.S. Government Printing Office.

Office of Technology Assessment. (1988). Power on! New tools for teachning and learning. Washington, D.C.: U.S. Government Printing Office.

Office of Technology Assessment. (1995). Teachers and technology: making the connection. Washington, D.C.: U.S. Government Printing Office.

Owston, R. D. (1997). The World Wide Web: A technology to enhance teaching and learning? Educational Researcher 26 (2), 27-33.

Patton, M.Q. (1990). Qualitative evaluation and research methods. Newberry Park, Ca: Sage Publications.

Picton, J.O., et.al. (1988) Personal administrative computing in rural schools. ERIC ED 298 941.

Quality Education Data. (1996). Technology in public schools. Installed base technology in US public schools, covering 1981-1996. ERIC ED 403 870.

Quality Education Data. (1997). Educational technology by state. (http://www.qeddata.com/sttech.htm).

Ritchie, D. (1996). The administrative role in the integration of technology. NASSP Bulletin, 80 (582), 42-52.

Roberts, P.A. (1997). What administrators need to know about technology. Principal, 76 (3), 20-22.

Ross, T. W. (1996). Preparing administrators for connected schools. ERIC ED 402644.

Ross, T.W., & Bailey, G.D. (1994). Wanted: A new literacy for the information age. NASSP Bulletin, 78 (563), 31-35.

Russell, A. (1996). Six stages for learning to use technology. ERIC ED 397 772.

Salvador, R. (1997). State education networks spread. Electronic Learning, 16 (6) 8.

Schofield, J. (1994). Cyberspace superhighways: Access, ethics and control. (gopher://riceinfo.rice.ed...More/Acceptable/eric).

Secretary's Commission on Achieving Necessary Skills. What Work Requires of Schools: A SCANS Report for America 2000. Washington, D.C.:

U.S. Government Printing Office.

Shelton, M & Jones, M. (1996). Staff development that works! A tale of four T's. NASSP Bulletin, 80 (582), 99-105.

Southern Technology Council (1997). Making technology happen. Best practices and policies from exemplary K-12 schools for teachers, principals, parents, policy makers and industry. Research Triangle Park, North Carolina: Author.

Stuhlman, J.M. (1994). Circumstances and experiences that lead to incorporating telecommunications into teaching practices. ERIC ED 374 812.

The Children's Partnership. (1994). America's children and the information superhighway. (http://www.childrenspartnership.org.).

The New Jersey municipal data book (1997). Palo Alto, CA: Information Publications.

Toffler, A. (1991). Power shift. New York:Bantam.

U.S. Advisory Council on the National Information Infrastructure. (1996). KickStart initiative: Connecting America's communities to the information highway. Washington, D.C.: U.S. Government Printing Office.

U.S. Congress. (1994). Improving America's Schools Act of 1994. (http://www.ed.gov/legislation/ESEA/toc.html.)

Wang, S., Johnson, S., & Pisapia, J. (1994). Understanding technology infusion: Comparing rural and urban contexts. ERIC ED 371 714.

Warren County Cultural Heritage Commission. (1998). Warren County. (http://www.beegle.com/ourcorner/warrencountynj.htm).

Whitworth, J. (1989). The microcomputer in the small school district. ERIC ED 310 907.

Wilson, T.F. (1995) High tech high: Cruising on the internet. NASSP Bulletin, 79 (572), 84-89.

Wilson, B., Ryder, M., McCahan, J., & Sherry, L. (1996). Cultural assimilation of the Internet: A case study. ERIC ED 397 772.

Windschitl, M. (1998). The WWW and classroom research: What path should we take? Educational Researcher, 27 (1) 28-33.

Witten, D.W. (1990). An analysis of administrative computer use by secondary principals in Kentucky. ERIC ED 343 258.

Wolcott, H. F. (1988). Ethnographic research in education. In R. M. Jaeger (Ed.), Complementary methods for research in education (pp 187-206). Washington, DC: American Educational Research Association.

Zenanko, M. (1996) A survey of Internet access and usage in a selected sample of Alabama schools. ERIC ED 403 873.

Zuckerman, M. (1994). America's silent revolution. U.S. News and World Report, 117 (3), 90.

Appendix A

Letter to Superintendents

59 Far View Road
Great Meadows, NJ 07838
(Date)

Superintendent of Schools
_____ Public Schools

Dear (Superintendent by name):

Please consider this letter a request to seek your assistance with my doctoral research at Seton Hall University, in the College of Education and Human Services, Department of Administration and Supervision. My topic is, Principal's Perceptions Regarding the Integration of the Internet into Elementary and Secondary Level Public Schools in Warren County, New Jersey.

This is a qualitative research project requiring personal interviews with building level principals. The interviews will last approximately thirty minutes. Participation is completely voluntary and participants will have the opportunity to withdraw from the study at any time. Data provided by the participants will remain completely confidential. No identifying information regarding the respondents or the school district will be included in the study.

May I please have permission to contact one or two of the principals in the district and request a personal interview on the aforementioned topic. I will telephone you shortly to determine if you are in agreement with my research project. Please do not hesitate to contact me at (908) 637-4544 if you have any questions or concerns.

Thank you for your time and consideration.

Yours truly,

Tracey Severns

Appendix B

Letter to Principals

Appendix B1

59 Far View Road
Great Meadows, NJ 07838
(Date)

Dear (Principal by name):

I am a doctoral student in the College of Education and Human Services, Department of Administration and Supervision, at Seton Hall University, working under the mentorship of Anthony Colella, Ph.D. My doctoral research addresses the role of the principal in the integration of computer technologies into public schools. Permission to conduct my research within the district has been granted by the superintendent of schools..

The study is entitled, Principals' Perceptions Regarding the Integration of the Internet into Elementary and Secondary Level Public Schools in Warren County, New Jersey. In the research, I will request participation of several principals throughout the county. Participants will be asked to complete a brief demographic questionnaire and to participate in an oral interview which will be tape recorded. Interviews will last approximately thirty minutes.

Your participation is completely voluntary and you may withdraw from the study at any time without penalty or consequence. Data provided by the participants will be handled with the strictest confidentiality. No individual will be identified. The responses of all respondents will be combined in the presentation of the data. The school district will not be identified in the study.

Upon your request, I will gladly provide you with the aggregated results of the completed study. If you have any questions about the research, please contact me at (908) 637-4544. I will contact you shortly in order to determine if you are willing participate in this research project.

Thank you for your time and consideration.

Yours truly,

Tracey Severns

Appendix B2

Informed Consent

This project has been reviewed and approved by the Seton Hall University Institutional Review Board for Human Subjects Research. The IRB believes that the research procedures adequately safeguard the subject's privacy, welfare, civil liberties, and rights. The Chairperson of the IRB may be reached through the Office of Grants and Research Services. The telephone number of the office is (973) 378-9809.

I have read the material above, and any questions I asked have been answered to my satisfaction. I agree to participate in this activity, realizing that I may withdraw from the study at any time without penalty or consequence. I agree to permit the researcher to tape record the interview and I understand that all tape recordings will be destroyed at the conclusion of the study.

_____ _____

Participant Date

____I would like to receive a copy of the aggregated results upon completion of this study. Please forward the results to:

Address: _____

_____

Appendix C

Standardized Open-Ended Interview Instrument

1. What is the current status of computer technology in your school?

2. How would you describe your school's technological mission?

3. You've talked about where you "are" and where you would like "to be", how do you plan to move from the current state of affairs toward the realization of these goals?

4. How would you characterize the role of the principal in the introduction and integration of computers in schools?

5. Imagine yourself at a PTA meeting and parents are asking why it is necessary to provide children in this age group access to the Internet. What would you say to them?

6. In addition to the educational benefits made available through the Internet, there is also the potential for problems. What safety, liability and educational concerns must be addressed before schools are ready to tap into the Internet?
(What must be done to ensure that these concerns are addressed?)

7. Few schools are able to avoid the issue of limited resources as a factor effecting the use of computers in general, and the Internet in particular. What kinds of expenditures on technology would you like to see for the district as a whole and your school in particular?

8. Take a moment to imagine what schools will be like ten years from now. Describe what we would see, hear and experience in such a school?

9. Tell me about your own computing experience.

10. What steps will you take to establish and update your knowledge of the most current uses of technology in education?

11. What behaviors will you model for students and staff in your use of various technologies?

Appendix D

Interview Checklist

BEFORE

___ Review district documentation and Warren County Technology Plan.
Determine level of connectivity, amount of $ budgeted, technology coordinator, etc.

___ Gather materials
- ___ tape recorder
- ___ tapes
- ___ batteries
- ___ electric cord
- ___ demographic questionnaire
- ___ interview questionnaire
- ___ pen
- ___ notepad

___ Directions to location

DURING

___ Signed Informed Consent

___ Note beginning and ending time of interview

AFTER

___ Note observational data
- ___ Personal impressions: voice quality, tone, and volume; eye contact, body language; confidence level.
- ___ Location: room, seating arrangements
- ___ Presence, location and status of computer equipment

___ Thank you (mail personal note of thanks)

Appendix E

Demographic Questionnaire

Demographic Questionnaire

1. Interview Date _____

2. Education level at which currently serving as principal
   Elementary School _____
   Middle School _____
   High School _____

3. Number of years of experience at each educational level
   Elementary School _____
   Middle School _____
   High School _____

4. At what age were you first hired as a principal? _____

5. Complete the following chart:

Degree	Area of Concentration	Date of Graduation
_____	_____	_____
_____	_____	_____
_____	_____	_____

6. Circle your age range
   20-29 30-39 40-49 50-59 60-69 70-79

7. Circle your gender category
   male female